The development of a model for decision-making for the adoption and maintenance of the next generation integrated library systems at South African Public Universities

by

REGINA BALENGANE SIKHOSANA

22175407

A dissertation submitted in fulfilment of the requirement for the

Doctor of Library and Information Science degree

Faculty of Accounting and Informatics, Department of Information Systems, Durban University of Technology

2025

Supervisor: Prof. M. Rajkoomar

Co-Supervisor: Dr N. Sentoo

DECLARATION

I, *Regina Balengane Sikhosana*, declare that:

(i) The research reported in this dissertation, except where otherwise indicated, is my original research.

(ii) This dissertation has not been submitted for any degree or examination at any other university.

(iii) This dissertation does not contain other persons' data, pictures, graphs, or other information, unless specifically acknowledged as being sourced from other persons.

(iv) This dissertation does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:

- Their words have been re-written, but the general information attributed to them has been referenced.
- Where their exact words have been used, their writing has been placed inside quotation marks and referenced.

(v) This dissertation does not contain text, graphics, or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the dissertation and in the Reference Section of this dissertation.

Signature:

Date: 23 July 2025

DEDICATION

I dedicate this work to the Almighty God in appreciation of all his merciful acts and for enabling me to finish this course to the glory of His holiness

ACKNOWLEDGEMENT

I owe all the credit for my ability to complete my doctoral program to God's grace, which provided me with the knowledge, determination, and perseverance I needed.

My sincere appreciation and thanks go out to my dedicated supervisor, Dr Mogiveny Rajkoomar, and co-supervisor Dr Naresh Sentoo for all their contributions, support, and inspiration. I really value all that you do.

Special thanks to my beloved mother Stella Sikhosana for her prayers, love, support, and motivation. I am blessed to have you in my life.

To my two sons Njongo and Keamogetswe Sikhosana, thank you for your support. A special thanks to Njongo for his love, sacrifice, understanding, motivation and sharing the difficulties encountered in this doctoral journey.

To my elder sister Lillian Nkhumise and her children and granddaughter, a special thank you for all you have done to help me on my doctoral journey.

To my beloved friend Simphiwe Seti for your support, prayers, motivation, and encouragement I feel blessed to have you as a friend.

To my Statistician Stanley Lekata and Editor Dr. Patricia-Anne Harpur for your assistance encouragement and support in this doctoral journey.

To my mentor, Dr Mluleki Majavu, and thank you for your assistance, prayers, and motivation.

To Cape Peninsula University of Technology for making this study possible. Special thanks to CPGS (Center for Postgraduate Studies) staff especially for their continued motivation and encouragement in this doctoral journey.

I would also like to express my appreciation to Durban University of Technology (DUT) for all the support in making this study possible.

ABSTRACT

The fourth industrial revolution (4IR) has influenced all academic libraries in higher education institutions, and Library and Information Science (LIS) professionals who have accrued their skills and experience over decades are still facing challenges in managing a variety of print and digital resources with limited resources and budgets. It has become imperative in all academic libraries that there is a disparity in the emerging technologies and skills required by LIS professionals in managing library systems. The aim of this doctoral study was to explore the nature and extent of adoption and maintenance of the next generation ILS in academic libraries, to develop a model for the adoption and maintenance thereof. The theoretical frameworks Technological Acceptance Models (TAM), Unified Theory Use of Technology Acceptance Model (UTAUT), Gardner Hype Cycle model, and Siguenza-Guzman framework were used to examine competencies, skills and technological knowledge of the adoption and maintenance of the next generation integrated library system of LIS professionals as managers of library management systems (LMS) in the digital environment. A sequential explanatory mixed method design framed the research approach. During the quantitative phase, a web based exploratory survey was administered to LIS professionals at academic libraries in South Africa. The emerging themes from the web-based exploratory survey was used to design the interview schedule for the second qualitative phase. The results from both phases were analysed and interpreted to present the findings. The results from data collected were then triangulated with the theoretical frameworks and reviewed literature. The key findings revealed that most academic libraries have begun to adopt the maturing next-generation ILS, with early adopters stating that academic libraries need more collaborations through library consortiums to move towards a shared next generation ILS, allowing for increased collaboration while reducing costs on individual software purchases. Consequently, LIS professionals need acquire technical and technological skills to support library users for learning, teaching, and research in the Fourth Industrial Revolution. The study recommends system, methods, and processes that the Library and Information Science sector can implement to ensure that LIS professionals gain the necessary expertise to manage their library management system in the digital environment. Finally, the study proposes the development of a model of decision-making for the adoption and maintenance of next generation ILS for LIS professionals in academic libraries in South Africa.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

ALS	Automated Library Systems
API	Application Programming Interface
CALICO	Cape Library Consortium
CHELiN	Cape Higher Education Library Network
CHEC	Cape Higher Education Consortium
CHELSA	Committee of Higher Education Libraries
CPUT	Cape Peninsula University of Technology
CUT	Central University of Technology
DUT	Durban University of Technology
EsSAL	Eastern Seaboard Association of Libraries
FRELICO	Free State Library and Information Consortium
GAELIC	Gauteng and Environs Library Consortium
HE	Higher Education
IaaS	Infrastructure as a Service
ICT	Information Communication Technologies
ILS	Integrated Library System
IS	Information Systems
LIASA	Library and Information Association of South Africa

LIS	Library and Information Science
LMS	Library Management System
LSP	Library Services Platform
NMU	Nelson Mandela University
NWU	Northwest University
OA	Open Access
OCLC	Online Computer Library Centre
OPAC	Online Public Access Catalogue
OSS	Open-Source Software
SA	South African
SEALS	South-Eastern Alliance of Library Systems
SOA	Service-Oriented Architecture
TAM	Technology Acceptance Model
SANLIC	South African National Library Consortium
SPSS	Statistical Package for the Social Science
SPU	Sol Plaaitjie University
UCT	University of the Western Cape
UJ	University of Johannesburg
UL	University of Limpopo

UKZN	University of KwaZulu-Natal
UNISA	University of South Africa
UNIVEN	University of Venda
UTAUT	Unified Theory of Acceptance and Use of Technology
UWC	University of the Western Cape
VUT	Vaal University of Technology
WITS	University of Witwatersrand
WWW	World Wide Web
WUSU	Walter Sisulu University

LIST OF TERMINOLOGY

Cloud computing: it is a concept for providing simple, on-demand network access to a shared pool of programmable computing resources (such as networks, servers, storage, applications, and services) that can be quickly supplied and released with little administration work or service provider engagement (Shaw & De Sarkar 2020: 309).

Disruptive technology: is a type of technology that enables inexperienced users to do actions but tends to disrupt current habits (Gartner, 2020).

Integrated library system: a set of library software that integrates modules for circulation, acquisition, end-user searching, database access, and other library tasks through a common set of interfaces (Sanaullah & Uddin, 2020:26).

Library Automation: refers to the use of computers to automate library processes like circulation and cataloguing (Muniraja, 2021: 192).

Next-generation integrated library Systems: a new management system that utilizes emerging technology to control current procedures and provides expanded access to collections (Ocloo & King, 2022:3).

Library consortium: is defined as a "collaborative alliance of independent libraries or library systems, established through a formalized agreement, mainly aimed at facilitating the systematic sharing of resources and services (Chisita, 2021: 4).

1. INTRODUCTION

1.1. Introduction and background

Academic libraries in South Africa encounter various difficulties both locally and globally. Emerging information technologies are a significant challenge for academic libraries because they are revolutionizing not only how information is packaged, processed, stored, and disseminated, but how users seek and access information (Raju, 2020). Digital learning environments have led to an increasing level of hybrid learning, integration of online learning environment and traditional face-to-face learning. While hybrid, learning and teaching modules, and online modules of academic staff and student communication are widely adopted, there are still inequalities manifested by the persistent digital divide, differentiated access to resources and connectivity, and limited funding for higher education institutions globally (Committee of Higher Education Libraries in South Africa, 2021).

The core mission of academic library services in higher education institutions is to support learning, teaching, and research. Globally, especially academic libraries, libraries are increasingly using Information Communication Technology (ICT) digital information. Advances in ICTs have a philosophical impact on the Library and Information Science (LIS) field. The implementation of ICT connecting diverse resources from various parts of the world to serve library users at anytime and anywhere led to an Industrial Revolution 4.0 and the creation of Library 4.0 (Hong & Anh, 2021:368). The new roles for library staff pre- and post-Covid-19 have emerged as strong transformative changes in academic libraries. These transformational changes have been identified as technological advances; library spaces and design; new pedagogies, user behaviour, needs, and expectations (Committee of Higher Education Libraries in South Africa, 2021).

Prior to the application of ICT, the task in academic libraries were performed manually and independently of one another, these tasks included: collection development, cataloguing and classification, circulation and reference services, current awareness, selective dissemination of information and other bibliographic services (Tella, Akwoma & Kayode, 2020). The previous traditional integrated ILS have become redundant as they were previously designed to manage print resources. Furthermore, library employees are dissatisfied with the existing state of ILS

products due to traditional library systems' lack of flexibility, inability to manage electronic information, and user experience that does not meet contemporary web expectations (Sanaullah & Uddin, 2020:2).

The introduction of the next generation ILS in academic libraries is developing. The next generation ILS is hosted on cloud and therefore library professionals need to acquire new skills and be aware of the application of cloud computing in library science (Salih, 2020). Cloud computing plays a vital role in the 21st century by offering infrastructures, platforms, and software as a service is receiving a great deal of attention among individuals, corporations, and governments by offering more dynamic technologies that make infrastructures more flexible and replaceable (Idlalama, 2020). Despite the growth and openness in the adoption of the next generation ILS, most academic libraries in South Africa are still using the outdated ILS commonly known as LMS. Fewer have adopted the next generation ILS or library service LSP and open-source LMS individually (Hussain, 2020). Selecting library management systems to manage library information resources is one of the biggest challenges South African academic libraries are facing in the development, adoption, and maintenance of integrated library systems (ILS) (Ocloo & King, 2022:4). Ocloo and King (2022) further states that the deployment of various information systems has enabled academic libraries to increasingly implement software solutions that involved distributed networking and access to remote information resources.

According to the Association of College and Research Libraries (2020) Ex Libris provides products like ALMA, which is a cloud-based LMS and controls a larger market share in academic libraries. On the other hand, librarians and programmers have worked together to produce several open sources ILS that use open licenses to ensure that open-source software (OSS) and its derivatives can be freely viewed, used, copied, or modified and redistributed (Moruf, Sani, & Abu, 2020:1273). According to Chisita (2021:4) most libraries operate in single entities while few of them have organized themselves into formal consortiums. This phenomenon is not unique to South Africa as indicated by the formation of local resource sharing consortia.

Currently, most academic libraries in South Africa are still working in silos and are stuck, using aging client server-based ILS/LMS. The purpose of this study is to explore the nature and adoption development of a decision-making model for the adoption and maintenance of next-

generation integrated library systems (ILS) in South African academic libraries. Successful implementation of the adoption and maintenance of the next generation integrated library systems (ILSs) in academic libraries can lead academic libraries to effectively manage print, digital resources, and other forms of library collections (Tella *et.al.,* 2020).

Next generation ILS will take advantage of a cloud computing Software-as-a-Service (SaaS) model where a single instance of a product is provided to multiple customers on a subscription basis (Shaw & De Sarkar, 2020). According to Moruf *et al*. (2020) SaaS will manage library resources in a thorough, unified manner regardless of resource format or location. Library consortia also play a vital role in partnership and collaboration instances in academic libraries globally. South Africa and the United States are the most prolific countries that collaborate with each library and information science research (Asubiaro & Badmus, 2020). In Ghana, a study conducted by Ocloo and King (2022) recommended a collaborative approach in the adoption of ILMS with adequate training through library consortium. In 2021, Chisita from Zimbabwe proposed a national library consortium model for National Development in Zimbabwe (Chisita, 2021). On the national development stage, the proposed model successfully echoes and elevates the fundamental library consortium principle of cooperation and sharing. The proposed national library consortium will have a broad commitment to advancing universal access to information, which will be reflected in its vision. Library consortiums can assist libraries in the collective purchasing of library integrated systems (ILSs) or library services platforms (LSPs) to manage their information resources and cost saving of library budgets in the current economic crisis. Kouis, Kyprianos and Eftymiou (2021) found that Hellenic Academic libraries influenced by the recent economic crisis accelerated the decision of the library to adopt a more suitable schema regarding their core and future function by forming a consortium. The "consortium endeavoured to replace libraries' local system with multi-tenant shared LMS in a local shared infrastructure" (Kouis *et a*l., 2021:455). The next generation integrated library systems (ILS) are hosted on the cloud and therefore library professionals need to acquire new skills and be aware of the application of cloud computing in library science (Sanaullah & Uddin, 2020). This study explored the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

1.2. Contextual settings

Historically, the merger of higher education institutions was as the result of the National Plan for Higher Education detailed restructuring of the South African Higher education landscape in 2001, which until after 1994 was fragmented (Council of Higher Education, 2021). The history of apartheid in South Africa in the 1990's and the social exclusion of majority of South African population from decision-making into processes such as higher education that allow extensive participation in the development of policy and social structures, resulted in the urgent need to join the global economy from which it was excluded (Boughey & McKenna, 2021). In 2012, the merger of 31 higher education institutions leads to the establishment of 11 new institutions from 26 merger partners (Curaj, Georghiou & Harper, 2015). The president of South Africa further announced in 2019 the merger of Higher Education and Training with Research and Innovation (Coetzee *et.al*., 2021).

The mission and vision of the higher education institutions in South Africa is to support learning, teaching and research. The study involved twenty-six public funded universities consisting of twelve traditional universities, eight comprehensive universities, and six universities of technology. Therefore, the rationale of selecting LIS professionals from academic libraries is that their pattern of transformation remains similar. These universities include:

Traditional Universities:

- North-West University
- Rhodes University
- Sefako Makgatho Health Sciences University
- Stellenbosch University
- University of Cape Town
- University of Fort Hare
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of the Free State

- University of the Western Cape
- University of the Witwatersrand

Comprehensive Universities:

- Nelson Mandela University
- Sol Plaatje University
- University of Johannesburg
- University of Mpumalanga
- University of South Africa
- University of Venda
- University of Zululand
- Walter Sisulu University

University of Technology (UOT's)

- Cape Peninsula University of Technology
- Central University of Technology
- Durban University of Technology
- Mangosuthu University of Technology
- Tshwane University of Technology
- Vaal University of Technology

The impact of the 4th Industrial revolution and Covid-19 has led libraries to advance in new technologies, redesign their library spaces, introduce new pedagogies, user behaviors, needs and expectations, new roles of staff have emerged as a transformative driver for change in academic libraries (Committee of Higher Education Libraries in South Africa, 2021). Furthermore, LIS professionals need to be familiar with the use of technologies and be aware of the current trends in the development of the new ILS products in the market used in academic libraries for managing their library systems and be highly skilled in using digital technologies in the provision of library services (Sawant & Yadav, 2022).

1.3. Research problem

The disruption of technology has led academic libraries to provide new web-based tools with greater interoperability of technologies, especially between the online management system and the cloud based integrated library systems, catalogues and research support services (Committee of Higher Education, 2021). Currently, academic libraries since Covid-19 have seized opportunities to strategize and provide virtual services in support of learning, teaching and research (Chisita & Chizoma, 2020). Breeding (2020) states that although academic library businesses have gone beyond core resources management system and discovery services, it will take a substantial development to both maintain existing and built next generation technologies for the emerging realities of a given library. Recent studies in Ghana by Ocloo and King (2022:3) and in South Africa by Sikhosana, Rajkoomar and Sentoo (2022:12) concluded that most academic libraries are still working in silos and stuck in aging client server-based systems, there is a need to form a national consortium that will assist in easy implementation of the and for members to collectively purchase LMS in order to reduce costs this will involve ensuring that there are experts available to assist in system installations. According to (Sanaullah & Uddin, 2020:3) there is a gap in the literature on the adoption and maintenance of the next generation integrated library system next generation. The aim of the study was to to explore the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

1.4. Aim and objectives

This study aimed to explore the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

The aim of the study led to the following four objectives (O1 – O4) which underpin the study:

[O1]: To determine the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

[O2]: To identify the requirement of competencies amongst LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries in South Africa.

[O3]: To determine how privacy and security is maintained in the adoption of the next ILS in academic libraries in South Africa.

[O4]: To develop a model for decision making for the adoption and maintenance of the next generation ILS in academic libraries.

1.5. Critical questions

Four critical questions generated to meet the objective of the study include:

[RQ1]: What is the nature and extent of the adoption and maintenance of the next generation library ILS in academic libraries in South Africa?

[RQ2]: What are the requirements to determine competencies among LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries?

[RQ3]: How is privacy and security maintained in the adoption of the next ILS in academic libraries?

[RQ4]: What model can be developed for the successful adoption and maintenance of the next generation ILS in academic libraries?

1.6 Significance of study

The next generation ILS was introduced more than a decade ago and is still in the process of being adopted by academic libraries in South Africa. The discussions and deliberations and development of the model for the adoption of the next generation in integrated library systems are crucial for LIS professionals in the 21st century. Globally, this topic is valuable and has relevance to the Library and Information Sector (LIS). The researcher, being positioned within the South African context, explored, examined the adoption and maintenance of the next generation library systems (ILS) with reference to LIS professionals in academic libraries in South Africa. However, the benefit of LIS professionals with computer related skills for the adoption and maintenance of next generation ILS extend beyond academic libraries in South Africa. Globally, these computer related skills should be included in the curriculum so that

future LIS in Africa incorporates these computer related skills in the curriculum. Further, these computer related skills are needed for LIS tools, proof for LIS framework and theories, implementation of ideas and library software.

1.7 Limitation of the study

The research study was limited to academic institutions geographically located in nine provinces across South Africa and focuses only on academic libraries using the next generation ILS as their library management system (LMS) to maintain and manage library information resources. Exclusions include public libraries, special libraries, and research libraries.

1.8 Scope and delimitations of the study

The discussion, deliberation, conceptualizing frames for development of model for decision-making for the adoption and maintenance of next generation ILS by LIS professionals in academic libraries. Globally this topic is important and has relevance for Library and Information Sector. The researcher, been positioned within the South African context, explored and probed next generation adoption with reference to LIS professionals at Public Universities in South Africa. However, the benefit of LIS professionals with computer related or IT skills required for managing library systems extends beyond Public Universities in South Africa. The study looked at LIS employing library ILS systems to maintain and successfully manage library information resources.

1.9 Overview of research methodology

The researcher used sequential explanatory mixed method research (MMR). Pragmatism as a research approach, framed the research design and data collection procedures. Al-Ababneh (2020:79) state that research philosophy determines which research design is going to be used in the study, it underpins charts path the researcher will navigate in the study. This determines the research approach, method and tools used to determine the objectives of the study. According to Ngulube and Ukwoma (2021) mixed method research can enhance insight into library and information science by providing more inclusive picture of research questions relating to LIS than either qualitative or quantitative method can achieve alone. MMR was considered relevant to address the research problem, critical questions, and objectives of the study. In the context of this study, MMR was most suitable to address the research problem.

In exploring the extend of adoption and maintenance of the next generation ILS by LIS professionals, the researcher used both quantitative and qualitative as a mixed method approach. Ngulube (2022:20) state that MMR is the most recommended and used across many disciplines because multiple perspective of reality to a single study and its ability to offer an explanatory, exploratory, and confirmatory understanding of a phenomenon in one study, by combining qualitative and quantitative strategies. In terms of the former, the survey method through a web based exploratory questionnaire was used involving LIS professionals from all academic libraries (twenty-six) in South Africa. The survey method was appropriate and applicable as the objectives included reflections, exploration, integration and finding resolutions in determining the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

In this study, the researcher used sequential explanatory mixed method research (MMR), which contains first quantitative data collection, followed by qualitative data collection. The researcher collected quantitative in an online web survey (discussed in Chapter 4, Section 4.6) through questionnaires by using open-ended and closed questions for the first phase. The results were analysed using SPSS software. The quantitative results informed the researcher on which participants to be randomly selected for the qualitative phase of the research. The findings from the Web-based exploratory survey, the theoretical framework (see Chapter 2) and the literature review (see Chapter 3) guided the type of qualitative questions that were asked for the participants in the semi-structured online interviews with LIS directors(discussed in Section 4.6.1), in the second phase data from various data sources (theoretical framework, Web survey with LIS professionals, semi-structured online interviews with LIS directors were integrated during the data analysis and during the interpretation stage in the discussion of the findings. Priority was given to the second qualitative stage of the research as the researcher's aim was to work directly with LIS directors because of their strategic position in managing and purchasing of library management systems and software in developing a model for the adoption and maintenance of the next generation integrated ILS in academic libraries in South Africa. Lastly, the theoretical perspective was based on the objectives of the study, the research questions and the research context which guided the researcher to select pragmatism as the epistemological lenses for this study (see Chapter 4, Section 4.8.1). Mixed Method research (MMR) according to Ngulube (2022) can assist researchers to develop, explain and validate theory in one study.

1.10 Research Output

The research output of this study is presented below, which includes one chapter of one book:

Sikhosana, R.B, Rajkoomar, M. & Sentoo, R.N. 2022. Adoption and maintenance of the next-generation integrated library systems (ILS) in academic libraries. In: T.M. Masenya (Ed.), *Innovative Technologies for enhancing knowledge access in academic libraries*. IGI Global. [Online]. Available: https://www.igi-global.com/chapter/adoption-and-maintenance-of-the-next-generation-integrated-library-systems-ils-in-academic-libraries/306438. (Accessed 22 August 2022).

1.11 Clarification of concepts

According to (Nayak & Singh, 2015:16), the definition of terms is a critical step in the literature review for the identification and definition of terms that readers will need to understand the proposed research project. He goes on to explain that defining terms when they first appear is important so that a reader does not read ahead in the proposal operating with one set of definitions only to find out later that the author is using different sets.

1.10.1 Early automize age

In basic terms, library automation is the use of PCs and PC-based items and organizations to perform various library exercises and limits (Ngozi, 2020:115). It has evolved into an umbrella term that encompasses, among other things, integrated library systems, digitization, and repository management (Breeding, 2019). Early automated systems focused on electronic and card catalogues, as well as the use of computers in libraries. The development of the library catalogue card and the associated online public access catalogues marks the beginning of post-industrial era library automation (Monyane, 2019). Attempts to use technology in libraries to conduct business date back to the 1930s, but it was not until the 1960s that major development of information technology in libraries began, particularly in Europe and North America (Ngozi, 2020). The shift from managing print resources to managing the rapid increase in electronic resources makes it difficult for libraries to manage their collection (Muniranja, 2021). Since its

inception in the 1970s, the Automated Library Systems have changed significantly, with factors including the explosive growth of the World Wide Web, known as the Internet, latest information technologies like open source, electronic resources, and user expectations (Moruf *et al*., 2020).

1.10.2 Library automation

Library automation systems are referred to as "use of computers in library work and services (Muniranja, 2021: 192). According to Ngozi (2020), the increasing dominance of electronic resources and digital content in academic libraries with the current atomization systems can support disruptive technology. Therefore, computerization of library housekeeping operation, predominance of computerization is known as library automation; the developments in library automation an online integrated library system, whether internationally or in Africa, take place quite rapidly (Monyane, 2019).

The 1980s was a period of gradual transition from in-house built systems to integrated library management systems created by third-party vendors. These systems came right on time when libraries were struggling to effectively manage their operations and functions (Parnis, 2018). The 1990s saw the rise of the internet and the evolution of digital libraries, as well as a rapid shift from mediated to unmediated user access to library resources (Ngozi, 2020). The automation library function was created to improve internal workflows. Library automation primarily aims to improve the management of library resources and services. Thus, the use of a suitable integrated library system is critical (Breeding, 2019). The last ten years have seen a reversal in library automation, with research efforts moving away from digital libraries and the library needs to update or upgrade the existing automation systems due to the library's increasingly diverse information needs (Harisanty, Shafira & Isbandy, 2020). Automation in libraries is primarily dependent on staff to facilitate and implement the process (Ngozi, 2020)

Globally, libraries are digitizing their print collections or subscribing to e-journals to make them more accessible and to improve resource sharing through library consortiums (Monyane, 2019). Scholars and publishers now require open-source publications so that they can be widely accessed by other researchers and communities (Benedetti *et.al,* 2020). Most academic libraries are migrating to the next generation ILS that are cloud-based facilities. In contrast to existing ILS systems, which are closed proprietary systems that are difficult to integrate with external

systems, cloud computing solutions via SOA (Service oriented architecture) offer the ability to enhance existing applications or add new services via APIs (application program interfaces), which can be shared by the entire community via "apps galleries" (Salih, 2020).

1.10.3 Integrated library system

An integrated library system (ILS), known as a library management system (LMS), is an enterprise resource planning (ERP) that combines all library modules, such as acquisitions, cataloguing, circulation, serial control, information, and reference services, into one cohesive package to manage library processes. (Sikhosana, *et.al*, 2022; Grammenis & Mourikis, 2020; Sanaullah & Uddin, 2020). Oyakele (2018) gave a distinctive explanation that ILS is categorized into a proprietary and open-source integrated library. Proprietary ILSs are commercial and protected by copyright and have strict restrictions on use and distribution whereas open-source ILSs are free. ILSs in most cases are usually hosted on local servers and managed by library personnel or contractors (Sanaullah & Uddin, 2020; Cisneros-Corrales, 2021). Traditional ILSs are becoming redundant and being replaced with newer library systems known as the next generation ILS. Oyakele (2018:5), defines an integrated library system (ILS) as:

> "*Software for libraries that combine modules for cataloguing, circulation, acquisition, end-user searching, database access, and other library functions through a common set of interface database*."

1.10.4 Cloud Computing

Another key feature that distinguishes a next generation ILS from a traditional ILS is cloud computing. The term "cloud computing" is admired by many users, both individually and institutionally, because it provides transparency and applications and allows users to access it without prior knowledge or experience, based on the available technological and material possibilities (Salih, 2020). Gartner Group adds "massively scalable and elastic IT-enabled capabilities" to its definition (Gartner, 2020). The next generation ILS are hosted "in the cloud". Shaw and De Sarkar (2020: 309) cloud computing in various terms as:

"*Cloud computing refers to the provision of computing and storage capacity as a service to a diverse group of end users; it entrusts service with user data, software, and other information*".

The cloud computing infrastructure is housed in a large data center and is managed by a third party, who provides computing resources to anyone with an internet connection, anywhere in the world (Sivankalai, 2021). According to Salih (2020), the National Institute of Standards has agreed on a set of characteristics that define cloud computing systems:

- On-demand self-service.
- Broad network access.
- Resource pooling.
- Rapid elasticity.
- Measured service.

Furthermore, Salih (2020:239) described three types of cloud computing technology service as:

- Infrastructure as service: the basic layer of cloud computing (IaaS).
- Platform as a service: such as the service of environmental computing or platform is the next level cloud (PaaS).
- Software as a service is the highest level of cloud as software apps or library data are hosted (SaaS).

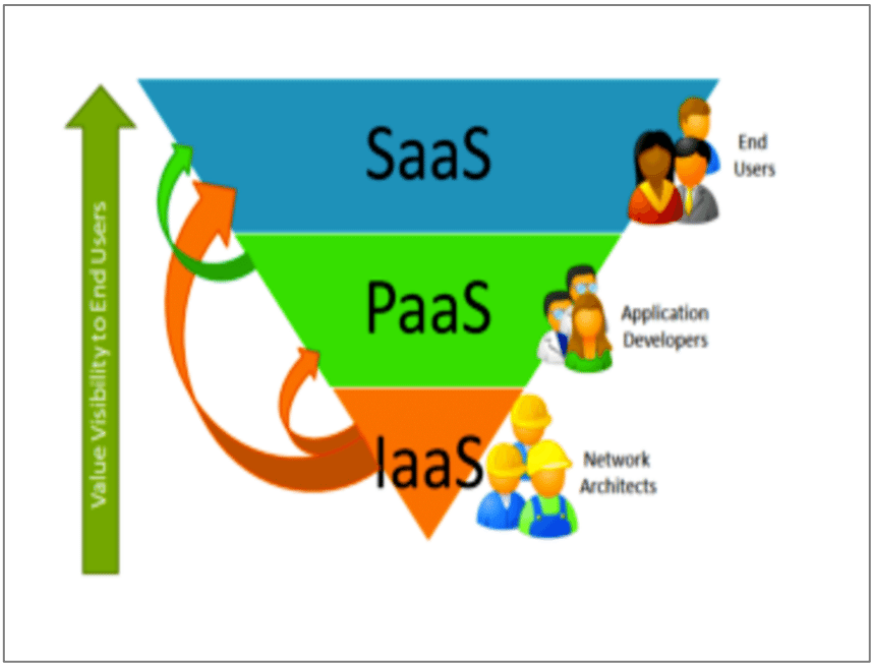

Figure 1-1 Cloud Computing Services (Salih, 2020:239)

During the Third Industrial Revolution, cloud computing emerged as a "disruptive technology," allowing new users to do things and disrupting new practices, whereas "sustaining technology" enhances traditional activities (Nkiko & Okuonghae, 2021). The next generation of ILS should use the web as a platform to fulfill the notion of Software-as-a-Service (SaaS), Infrastructure as a Service (IaaS), or further, Platform as a Service (PaaS) (Njoku & Ken-Agbiriogu, 2021). The next generation ILSs are hosted on cloud and are one of the components of the Fourth IR. Therefore, one of the major concerns when considering the risks of using cloud computing is data security; lack of data visibility, poor data control, and other issues are associated with cloud computing implementation (Joshi et al., 2021).

Currently, academic libraries are relying profoundly on library services platforms (LSP) or next generation ILS to manage system functionalities from cataloguing to circulation of library material and discovery tools. Artificial intelligence (AI)-driven technologies including chatbots, automated cataloguing systems, and resource utilization prediction analytics are being investigated to improve the effectiveness of library administration as well as the quality of research assistance provided to faculties and students (Mallikarjuna, 2024). Libraries need to adapt to modern technologies and develop expertise in evaluating the systems themselves.

1.10.5 Next-generation integrated library Systems (ILSs)

The next generation ILS emerged during 2011 at the clean slate of the new cycle of library automation. Library Service Platform (LSP) was the new concept proposed to differentiate the term next generation ILS from the traditional ILS. ILSs have been used often in library literature (Liu & Fu, 2018). Ocloo and King (2022:1) describes the next generation integrated library system (ILS) as the next generation library management systems (LMS) defined as a:

> "*New management system which makes use of developing technologies to manage current workflows and extended access to collections*."

Because both LPSs and the next generation ILSs are frequently used in library literature and libraries. Breeding (2020) suggests using the next generation ILSs for the new emerging systems to emphasize their integration feature and prevent any confusion it may cause. Pradhan (2019:15) outlined various characteristics of the next generation ILS as both functional and technical.

Functional characteristics

The following list comprises functional characteristics of the next generations ILSs:

- Management of Print formats of Material & ERMS (Electronic Resources Management Systems).
- Replacement of multiple Incumbent Products.
- Extensive metadata management.
- Knowledge basis.
- Collection management.
- Data Repository and Management.
- Discovery Services.
- Data Analytics and Reporting.
- Conceptual Organization.

- License Management.
- ILL and Resource Sharing.
- Link-Resolver.

Technical Characteristics

Technical characteristics of next generation ILSs encompass:

- Aspects Beyond Client Services/Server Computing.
- Cloud-based Architecture.
- SaaS/DaaS Platforms.
- Web-based interfaces.
- Multi-tenant Platforms.
- Services-Orientated Architecture.

Due to the cost and difficulty of changing systems, libraries tend to stick with their current systems unless they have a strong vendor or product dissatisfaction, or they believe certain technologies better align with their goals (Breeding, 2019). Because most academic libraries in South Africa are not members of a consortium, next-generation ILS have been installed as individual projects in academic libraries. However, system customization is not possible through a single person, a unified purchase of a system by academic libraries is important for cost saving in purchasing a new system (Sivankalai, 2021).

The next generation ILS is available on cloud; therefore, it is critical to have a stable network, as well as regular participation in discussion lists when using integrated library systems to keep up with the latest technological trends when planning to acquire a new system. According to (Ocloo and King, 2022), next-generation ILS allows for adequate monitoring, controlling, service delivery, access to bibliographic records, collaboration with other libraries, and improved access to information materials despite patrons' geographical locations. Acquiring a new system in academic libraries necessitates greater collaboration and resource sharing among libraries due to budget cuts in higher education institutions because of the global economic and

budgetary crisis. According to Adamu (2022), implementing a new system is one of the most significant and costly projects in academic libraries.

1.10.6 Library Consortium

Globally, library collaboration and cooperation are transforming the scholarship landscape as academic libraries fight to stay afloat in the face of rising subscription fees. Academic libraries and the educational institutions to which they belong are dealing with shrinking finances, ever-increasing user demands, and rising costs of books, journal subscriptions, and electronic resources (Chisita, 2021). This phenomenon is not unique to South Africa as indicated by the formation of local resource sharing consortia. Library consortium is defined by Samea (2015: 4) as:

"*a group of two or more libraries that have agreed to cooperate with each other in order to fulfil certain similar needs, usually resource sharing."*

In South Africa, five library consortiums were established in a period of six years between (1992-1998) geographically located in nine provinces (Thomas & Fourie, 2006).

Higher Education Consortium	Geographic Coverage	Library Consortium (Committee)	Library Consortium Formally Established
Cape Higher Education Consortium (CHEC) http://www.chec.ac.za/	Western Cape Province	Cape Library Consortium (CALICO)	1992
Eastern Cape Higher Education Association (ECHEA) http://www.echea.ac.za/	Eastern Cape Province	South Eastern Alliance of Library Systems (SEALS)	1998
Eastern Seaboard Association of Tertiary Institutions (esATI) http://www.esati.org.za/	KwaZulu-Natal Province	Eastern Seaboard Association of Libraries (esAL)	1997
Foundation of Tertiary Institutions of the Northern Metropolis (FOTIM) http://www.fotim.ac.za/	Incorporates the provinces of Gauteng, North West and Limpopo	Gauteng and Environs Library Consortium (GAELIC)	1996
Free State Higher Education Consortium http://www.uovs.ac.za/support/library/E_frelico.php	Free State Province	Free State Library and Information Consortium (FRELICO)	1996/7

Figure 1-2 Higher education consortium and academic library consortia 1992-1998 (Thomas and Fourie, 2006)

According to Thomas (2004) South Africa was previously made of various consortia namely:

- GAELIC (Gauteng and Environs Library Consortium) includes ten libraries (North -West University, Tshwane University of Technology, University of Johannesburg, University of Limpopo, University of Pretoria, University of South Africa, University of Witwatersrand, University of Venda, Vaal University of Technology, and University of Namibia).
- SEALS (South-Eastern Alliance of Library Systems) include four universities (Rhodes University, University of Forthare, Nelson Mandela University and Walter Sisulu University).
- FRELICO (Free State Library and Information Consortium) include two universities (University of Free State and Vaal University of Technology).
- EsSAL (Eastern Seaboard Association of Libraries) includes four universities (University of Zululand, Durban University of Technology, Mangosuthu University and University of Kea-Zulu Natal).
- CALICO (Cape Library Consortium) includes three universities (Cape Peninsula University of Technology, University of Western Cape, University of Cape Town, and Stellenbosch University).

The South African Development Goals (SDGs) 2030 resonates with the United Nation's SDGs (2015-2030) that present a shared at the heart of the agenda lie the 2030. The agenda lie the 17 SDGs, which addresses our global challenges, poverty, inequality, climate change, environmental degradation, peace and justice (South African National Science and Technology, 2023). The South African Voluntary National Review (VNR) report 2024 of SDGs confirmed that South Africa has committed itself to implementing all SDGs with an emphasis on SDG's 1,2,3,4,5,6,7,8,9, 13 and 17 (South Africa, Voluntary National Review, 2024). The realization of the SDG's depends on several factors including access to information.

Jahnavi *et.al.* (2021) opined that the establishment of better consortium integrating intellectual access are distinct steps moving towards 21st century libraries. The author argues that access to information is more important than collection building and further states that efforts have been made in the past to address problems of financial issues in libraries by sharing resources

through consortia. Chisita (2021) also emphasized that library consortia in Zimbabwe consortia need to collaborate with each other to fight increasing costs.

Ayoub, Ami and Wani (2018) view access to information as a tool to provide libraries with opportunities to gain access to more resources that may never be achieved independently. The author perceives that library consortia need to build more collaboration with libraries, vendors and publishers to increase access to information resources and quality services with limited resources.

Arch (2017) highlight centralized consortium support or management for member library digital repository platforms to showcase faculty scholarly work. Arch (2017) further state that will allow institutions to showcase disseminate full-text theses and dissertations (ETDs), datasets platforms for example Figshare, Open journal System (OJS) to support stand-alone publishing services for journals and other publications.

Samea (2015) also highlight that in Arab there is a special interest one single point for member libraries to have an electronic shared subscription, as such sharing will reduces costs in spending the library budget. South Africa is not an exception to this trend as it is evident by the establishment of sector specific library consortia, for example, SANLIC (South African National Library Consortium) which is a non-profit company that serves the interest of South African Higher Education libraries and National Research Council libraries. SANLIC actively promotes the use of high-quality, open-access electronic information resources and facilitates affordable access to scholarly electronic information in support of its members' teaching, learning, and research activities through collective negotiations with publishers and aggregators. However, SANLIC focuses on licensing and negotiating prices for scholarly electronic resources but not shared electronic resources subscription.

The failure to align library consortia to the national development vision will result marginalization of libraries thus undermining nation-wide access to information. The alignment of to the national development agenda aligns with IFLA’s global vision that seeks to develop strong and participatory communities to realize SDG’s (IFLA, 2025) support sustainable development. However, libraries to fully contribute towards national development must show that they can drive progress across the entire UN 2030 agenda. Therefore, libraries should establish consortiums as a platform to build mutual relationships and capacity for

national development. Furthermore, the challenges and opportunities the library consortiums are currently facing in South Africa were identified by CHELSA (Committee of Higher Education Libraries in South Africa, 2021). Both challenges and opportunities emerged, focused on challenges associated library leadership faced with strategic partnerships needed to harness the potential in equity of access. In South Africa, higher education institutions to contribute towards national development through their institutions by providing access to scholarly content (National Development Plan, 2012).

1.11 Structure of the research report

This chapter provided a background to the study, its research problem and contextualized next generation ILS, particularly in academic libraries. The chapter presented the research problem, the objective of the study and the research questions generated to address this objective, as well as the significance for the study. It provided an overview of the methodology adopted. The chapter clarified key concepts and limitations and outlined delimitations of the study.

Chapter 2 provides the theoretical framework of the research. The Siguenza-Guzman et al. framework for economic evaluation of libraries through a holistic approach was used to assist library evaluators in gaining a more holistic knowledge of the library system and library administration to improve and inform for the decision-making process. Technological Acceptance Models (TAM) including the Unified Theory and Use of Technology Acceptance (UTAUT), a technology acceptance model respectively explains user intentions to use information technology and subsequent user behaviour. Finally, the study applies the Gardner Hype Cycle model, to provide and to explain information on the adoption of emerging technologies.

Chapter 3 comprises a review of literature concerning the adoption and maintenance of the next generation ILS, particularly in academic libraries. The discussion includes the concept of library automation age and its relationship with trends and issues in academic libraries. It addresses the technological impact of the next generation ILS in libraries and explores cloud computing in relation to data privacy and security. Furthermore, the chapter visits the adoption by library professionals of next generation ILS in academic libraries. Finally, it investigates resource sharing and the role of library consortia at South African higher education institutions.

Chapter 4 provides a detailed explanation of the research design; the mixed methods research approach and methods used in the study. A pragmatic, interpretivist paradigm is employed to examine the level of adoption and maintenance of the next-generation ILS by ILS professionals in relation to trends and issues in academic libraries. The chapter outlines methods and instruments used to collect data. It provides an explanation for chosen data analysis techniques and processes.

Chapter 5 presents the findings obtained from the data analysis of collected quantitative and qualitative data.

Chapter 6 discusses the main findings in the context of the theories framing the study, relevant literature and the critical questions created to address the objective of the study. Based on this discussion conclusions are drawn; recommendation is made a model on decision-making for the adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa is presented.

1.12 Summary

This introductory chapter provided a background to the study and its research problem. It contextualized next generation ILS, particularly in academic libraries. The chapter presented the research problem, the associated objectives and research questions, generated to address the research objectives. It explored the significance of the study, outlining an overview of the adopted methodology, clarifying key concepts and defining limitations and delimitations of the study. The next chapter covers the theoretical framework of the study.

2. CONCEPTUAL FRAMEWORK

2.1. Introduction

This chapter focuses on theoretical framework and how the study is situated within the chosen theory. The chapter introduces the concept of theoretical framework and its role in research, explains the theoretical framework that is adopted for the study, indicates how it has been applied to other fields of study and in the library field and information science, and finally it explains how it is going to be used in research.

The term ‘research’ refers to an exploratory approach, investigating specific phenomena which are organized in a systematic manner (Khatri, 2020:1435). The research process includes systematic approaches, procedures, or tools for data collection and analysis, and is based on a paradigm or theoretical framework (Surucu & Maslakci, 2020). According to Ngulube and Mosha (2023) a researcher's use of a theory to comprehend a phenomenon is a general definition of the word theoretical frame. Furthermore, Surucu and Maslakci (2020) state that researchers should thoroughly analyze the literature review while creating a hypothesis in their studies and should form the hypothesis on a specific theoretical basis

The next generation ILS is viewed as a set of promises aimed at improving technology applications. To increase Library and Information Services (LIS) user acceptance and adoption, many competing models and theories are developed and put into practice. The theoretical framework in this study will assist the researcher in addressing the four main objectives and research questions of the study. One of the objectives of the study was to develop a model for decision-making for the adoption and maintenance of the next generation ILS in academic libraries. The development of a model on decision-making for the adoption and maintenance of the next generation integrated library system assisted libraries in effectively managing print, digital resources, and other forms of library collections, this observation is particularly relevant in the areas of collaboration in designing library systems that can integrate with other library services platforms to enhance the university's learning, teaching and research activities.

The researcher follows the established framework. It is regarded as the framework, scaffolding, or structure of the research. The theoretical framework in this study outlines the theory supporting the research problem, as well as the context and elements related to library

automation. In scientific research theories, research can be used in two ways: through either deductive or inductive reasoning . The fact that researchers do not create hypotheses based on the literature and theoretical framework causes conceptual and theoretical bias. Deductive approach to literature review typically makes use of theories and theoretical frameworks, in contrast, the inductive approach entails gathering data and developing theory based on data analysis results (Ravitch & Riggan, 2017). Therefore, theoretical frame illustrates a broader relationship between things based on theories, whereas conceptual framework is much more specific in defining this relationship (Van der Waldt, 2020). Subsequently, the researchers argue that the inductive approach tends to lead to the development of a conceptual framework. Hence this study followed an inductive approach. Based on Van der Waldt (2020), the researcher preferred to use the conceptual framework in the context of the explanation given above.

2.2. Decision-making and Next-generation Integrated Library System Development

The decision-making process in academic libraries is crucial and complex due to the numerous data sources, processing, and high volumes of data to be analyzed. Common data sources include integrated library systems, library portals, online catalogues, system consortiums, quality surveys, and university management (Siguenza-Guzman *et al*., 2014:2). These models and theories can aid researchers in their work as well as influence how technology is adopted and used (Hakemi & Masrom, 2019:20). Knowledge-based Decision Support Systems (DSS) provide important information to analyze situations that impact operations, and to make them faster and more documented; in the case of libraries, only a few studies are known to integrate aspects such as human resources, technological infrastructure, services, and library usage (Siguenza-Guzman *et.al*., 2014:4). Previously, library and information research examined information from a variety of perspectives, including information as content, information behavior, information society, information processing, information technology, and systems (Wibowo, 2019). A two-dimensional matrix that evaluates the libraries based on their library systems and collection from internal and external perspective was proposed by Nicholson (2004). This framework was adopted by (Siguenza-Guzman *et al*., 2014) due to its foundation to propose architecture and an integrated set of tools to holistically assess libraries systems. Furthermore, the implementation planned to assist library evaluators in gaining a more holistic

knowledge of the library systems and library administration in being better informed for their decision-making process.

Figure 2-1 Framework for economic evaluation of libraries through a holistic approach (Siguenza-Guzman et al., 2014:4)

The **internal perspective of the library system** – the cost analysis addresses the costs and resources of library processes and analyzed services. The authors described three available methodologies: traditional costing, activity-based costing, and time-driven activity-based costing, recommending the latter (Siguenza-Guzman *et al*., 2014).

The **external perspective of the library system** – quality is concerned with library processes and services accessed by the library users. The authors recommended at least one of the following methods: statistics gathering, suggestion boxes, Web user testing, user interface usability, and satisfaction survey (Siguenza-Guzman *et al*., 2014).

The **internal perspective of the library collection** – log analysis relates to analyzing usage patterns followed to manipulate the library system. The authors suggest the use of log analysis methods such as transaction and deep long analysis (Siguenza-Guzman *et al*., 2014).

In this digital age, where people frequently interact with and use technology and information systems, technology influences information media and user behaviors. It is critical to understand how technology acceptance models and theories fit in library and information science (Wibowo, 2019:1). Users accept or reject technology for a variety of reasons. In this study, models to measure technology acceptance will assist academic librarian's decision-making for the adoption and maintenance of the next generation ILS in academic libraries. This

will provide insight, guide and assist academic librarians with the selection and purchasing of next generation ILS.

2.3. Technology Acceptance Models (TAM)

The main challenge in the study involves understanding why people accept or reject new ICT and the introduction of modern technologies (Napitupulu, 2017:697). These factors could incorporate previous experience and skills, strength of character, abilities, or any workable plans that can control the factors. Successful behavior is dependent not only on positive intention, but also on behavioral control (Kashada, & Ahtiwsh, 2020:31). Figure 2-2 depicts the relationship between acceptance and satisfaction, as well as their influence on the intention to continue using the system based on TAM (Technology Acceptance Model) (Momani, 2020:80).

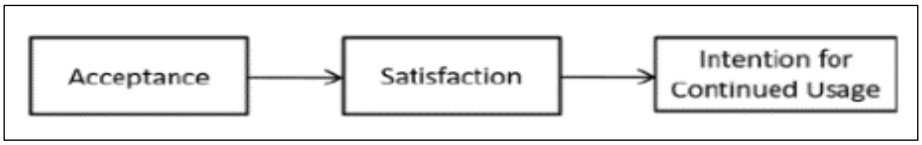

Figure 2-2 The influence of acceptance and satisfaction on continued usage intention (Momani, 2020)

Furthermore, perceived usefulness directly influences adoption intent, while perceived ease of use has either a direct or indirect effect through perceived usefulness on behavioral intent (Napitupulu, 2017). Therefore, academic libraries need to stop waiting for modern technologies to seem perfect for certain individuals. However, Ajibade (2018:1) argued that TAM is not suitable or applicable for firms, companies, or most organizations with rules and regulations, such as libraries, but for individual technology use and adoption. Given the high failure rate of ICT initiatives aimed at creating development opportunities, a solid understanding of the determinants of user acceptance of specific ICTs is crucial not only for theory building but for practical effectiveness (Napitupulu, 2017:697).

It can be therefore concluded that library staff in academic libraries in South Africa are making use of available systems in place in their institutions to data and network security do they employ to assist LIS professionals in maintaining data security and compliance. TAM is useful in understanding explanations about attitudes of academic librarians towards the adoption of

the next generation of ILS among LIS professionals. However, this framework is limited in probing the competencies and technical knowledge of academic librarians in the academic institutions in South Africa. Academic libraries can make use of this to transfer knowledge and skills for the adoption of new emerging technologies in the future to enhance individual worker performance.

2.4. Unified Theory and Use of Technology Acceptance (UTAUT) model

The acceptance of any information system by users is always determined by certain factors. Although the UTAUT model has been criticized by some researchers (Venkatesh, Thong, & Xu; 2016), it still acknowledges the importance of humans in information systems (IS), infrastructure and processes. However, it ignores the non-technical skills needed by LIS professionals. UTAUT model can be used to assess how adoption and maintenance of the next-generation ILS can result in successful implementation in academic libraries that meet their business requirements for efficient delivery of high-quality information, services, and systems. As indicated by Aytekin *et.al*. (2022:79) and Venkatesh *et.al.* (2016:5) explained that "Information Technology adoption and use in the workplace remains a central concern of information system and central practice and was not previously included in UTAUT as it only focused on behavioural use and intension". They further explain that the adoption and use of information technology in the workplace remains a central concern of information systems and central practice.

The UTAUT model identifies four factors – performance expectancy, effort expectancy, social influence, and facilitating conditions and four moderators – age, gender, experience, and voluntariness related to predicting behavioral intention to use technology and actual technology primarily used in an organizational context (Venkatesh *et.al*., 2013:8; Momani, 2020:82). Figure 2-3 depicts the UTAUT model.

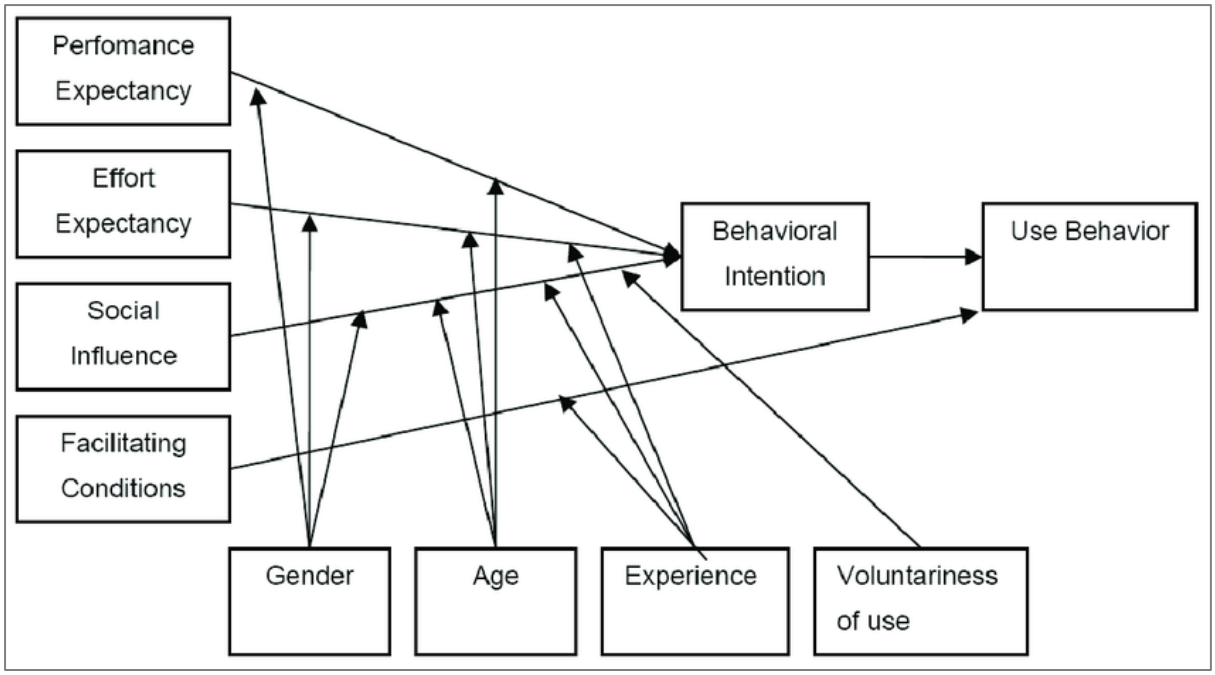

Figure 2-3 UTAUT Model (Venkatesh et al., 2013: 447)

Each factor represents a category of issues that need to be addressed. Moderate variables are assumed to moderate the influence of the three core constructs on behavioural intension and usage behaviour as indicated in Figure 2-3.

Performance expectancy (PE) is defined as "the degree of belief that the individual using the system will perform better". However, in theory, PE may differ depending on gender and age (Ayaz & Yanartaş, 2020:80). PE denotes the LIS professional's beliefs whether use of the next-generation ILS will enhance their technological skills and experience (Aytekin, Özköse & Ayaz, 2022:80). In this research topic, it is still of utmost importance to comprehend and establish the environment in which human organizations will adopt information systems.

The **effort expectancy (EE)** is concerned with issues of the system's ease to use, complexity, and the "degree to which individuals believe that the system helps to improve job performance" (Vialle *et al*., 2019:4; Momani, 2020:84). EE represents the LIS professional in academic libraries concerned with beliefs regarding easy use of the next-generation ILS.

The term "**social influence" (SI)** describes the "level to which a person who is deemed to be important to the individual believes that he or she should use the new system" (Venkatesh *et al.*, 2016). This factor becomes effective when the use of technology is mandatory and not

voluntary. However, gender, age, the voluntariness of use, and experience variables may differ on social influence (Aytekin *et al*., 2022; Momani, 2020). Although both the organizational infrastructure and processes domains are relevant, there is no specific mention of an innovative management approach or any elements of a model for adopting emerging technologies.

Ayas and Yanartas (2020: 2) define **facilitating conditions (FC)** as "the direct determinant of the adopting behavior." According to Aytekin et al. (2022), FC is a measure of an individual's level of belief in the existence of a system's technical and organizational infrastructure.

2.5. Gartner Hype Cycle

The Gartner Hype Cycle is a model that offers substantial information on the adoption of emerging technologies. Gartner specializes in providing information about IT firms that subscribe to its publications (O'Leary, 2008: 240). The Gartner Hype Cycle is a visual representation of a typical pattern that appears with every innovation in technology or another field (Gartner, 2020). The Gartner Hype Cycle shows emerging technologies in 2020, helping organizations to understand the adoption of emerging technologies. The model assists technology innovative leaders with an understanding of the opportunities for disruptive technologies, particularly those with transformational impact (Gartner, 2020). Furthermore, the Gartner Hype Cycle shows five emerging technology trends namely: digital me, composite architectures, formative AI (Artificial Intelligence), algorithm trust, and beyond silicon. Algorithm-based trust models are replacing trust models based on accountable authorities to ensure the privacy and security of data, the source of assets, and the identity of people and things. These models plan to help organizations ensure customers, employees, and partners are not exposed to risks and costs of losing their data when an innovation enters the market. There are five potential stages in Gartner Hype Cycle: technology trigger, the peak of excitement, trough of disillusionment, the slope of enlightenment and productivity (O'Leary, 2008: 242). The traditional technology impact curve of hype, denial, and gradual long-term transformation may be followed by 4IR disruptors (Reveas, 2019:21). Gartner Hype Cycles describes how an innovation typically develops, from over-enthusiasm through a stage of disillusionment to a final understanding of the relevance and role of the innovation in a market or domain (Gartner, 2020).

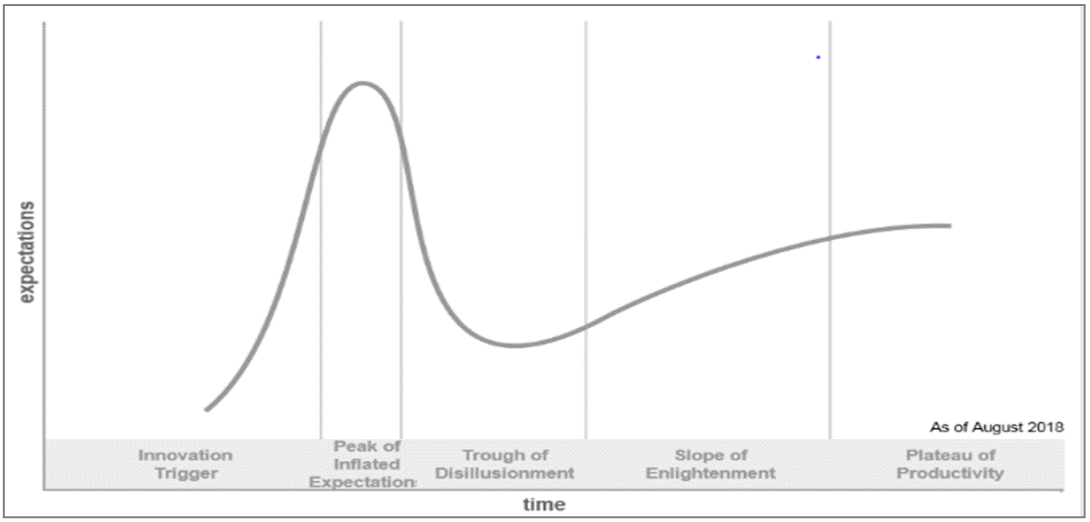

Figure 2-4 Gartner Hype Cycle (Gartner, 2018)

Gartner (2018) describe the Gartner Hype Cycle phases as the following:

1. *Technological/ Innovation trigger phase*: A breakthrough, public demonstration, product launch or other event generates press and industry interest in a technology innovation.
2. *Peak of Inflated Expectations:* A wave of "buzz" builds and the expectations for this innovation rise above the current reality of its capabilities. In a few cases, an investment bubble forms, as happened with the web and social media.
3. *Trough of Disillusionment:* Inevitably, impatience for results begins to replace the original excitement about potential value. problems with performance, slower-than-expected adoption, or a failure to deliver financial returns in the time anticipated all lead to missed expectations, and disillusionment sets in.
4. *Slope of Enlightenment:* Early adopters overcome the initial hurdles, begin to experience benefits, and recommit efforts to move forward. Organizations draw on the experience of the early adopters. Their understanding grows about where and how the innovation can be used to beneficial effect and, just as importantly, where it brings little or no value.

5. *Plateau of Productivity:* With the real-world benefits of the innovation demonstrated and accepted, growing numbers of organizations feel comfortable with the now greatly reduced levels of risk. A sharp rise in adoption begins (resembling a hockey stick when shown graphically), and penetration accelerates rapidly because of productive and useful value.

Managing change in academic libraries requires library leadership to be well-versed in best practices for systematically adapting the work of the entire organization. For libraries to thrive in a VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) world, current and future leaders need to develop their management skills (Association of College and Research Libraries, 2020).

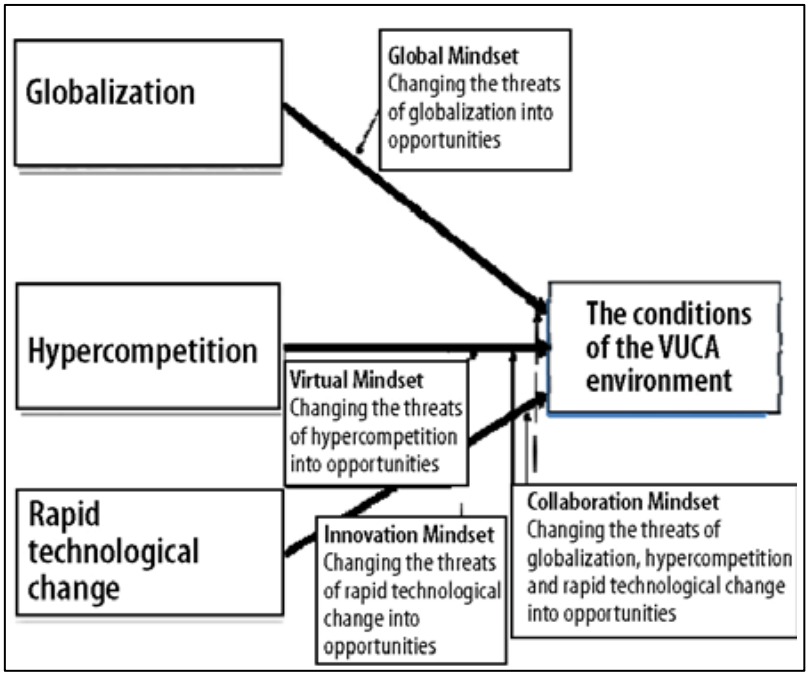

Figure 2-5 Framework showing relationships by VUCA environment (Adapted from Lahiri et al., 2008: p.313)

The key preconditions for the VUCA environment are created by globalization, hyper competition, and rapid technical change (Kaivo-Oja & Lauraeus, 2018) for key elements of competitive landscape which are relevant for the VUCA environment.

These include:

- A *global mindset* or the ability to view the world using a broad perspective converts globalization threats into growth opportunities by thinking beyond geographic boundaries, valuing integration across borders, and valuing regional and cultural diversity (Kaivo-Oja & Lauraeus, 2018).
- A *virtual mindset,* or the ability of managers to outsource their business operations to outside vendors, transforms hyper-competition into growth prospects by enabling flexibility and responsiveness (Kaivo-Oja & Lauraeus, 2018).
- Finally, a *collaboration mindset* means willingness to allow companies or corporations. We conclude that four critical mindsets help companies manage disruptive technological innovation (Kaivo-Oja & Lauraeus, 2018). The ability to turn threats into opportunities is a key advantage in VUCA conditions (Association of College and Research libraries, 2020).

Gartner Hype Cycle model will assist libraries in decision-making on selecting models to ensure the privacy and security of data for the adoption and maintenance of the next ILS in libraries. In the past, as the trend toward digitization, machine learning, and artificial intelligence accelerated, libraries have started to notice the disruptive technology of the Fourth Industrial Revolution (4th IR).

2.6 UTAUT Factors Effective for the Adoption of the Next generation LIS

This study attempts to integrate Siguenza-Guzman framework, TAM and Gardner Hype model including other critical factors into UTAUT model to propose an improved model that provides inside and understanding on predicting the adoption of the next generation ILS. Specifically, it proposed 23-factors from six drivers, identified as indicators, confirmed their reliability and validity as well as goodness of fit, and evaluated the framework using coefficients generated from Cronbach Alpha (Chapter section 5.2). In total six hypothesis relationship were supported from (0.06 >0.09) with its factors differing from its statistical coefficients ranging from excellent, good, acceptable, questionable, poor, and not acceptable. The importance in these studies in the adoption and maintenance of the next generation ILS was revealed (see more

detail discussion (Chapter 6 section 7.1) The result of each independent factor is discussed below:

H1 Performance expectancy (PE)

'**Technological factors'** by staff by utilizing any next generation ILS, support provided by vendors or ILS/IT service providers i.e., information quality, system quality, and after sale quality, Cronbach Alpha shows that there was a positive correlation of 0.822 (0.8 < 0.9) between technological factors and adoption of next generation ILS.

H2 Effort expectancy (EE)

'**User training quality,'** will be determined by the staff and user experience from user training, use of next generation ILS, and logging onto the system till the end of their transactions. H2 was stated to determine whether user training qualities as a training factor affect the adoption and maintenance. Cronbach Alpha depicts a poor correlation of 0.633 (< 0.6**)** . Thus, H2 as stated in this study is questionable.

H3 Social Influence (SI)

'Librarians factors" i.e., computer self-efficiency and librarians experience. Staff accessing next generation ILS of the libraries to perform cataloguing, information retrieval (discovery tool), transactions (circulating of library material), data analysis, statistics, data analysis and conversation. Cronbach Alpha correlation indicates there was a positive correlation of 0.888 (0.8 < 0.9) between librarians' factors and use of the next generation ILS in academic libraries in South Africa.

H4 Facilitating conditions (EE)

'Organizational factors' the desired characteristics of the specific next generation ILS in the libraries selected for this study. Specific qualities to look out for is i.e., technical infrastructure to support use of the system. Cronbach Alpha correlation indicates there was a positive correlation of 0.888 (0.8 < 0.9) between organizational factors and adoption of the next generation ILS in academic libraries in South Africa.

H6 Trust expectancy

'Environmental Conditions' such as trust expectancy is concerned with data and information security. Cronbach Alpha indicates there was an excellent correlation of 0.936 (< 0.9) between data network security compliance and the adoption of next generation ILS.

H6 Financial Factors (FF) -

'Cost analysis factors' is concerned with the costs and resources of library process, vendor support, and system evaluation. . Cronbach Alpha shows that there was a positive correlation of 0.822 (0.8 < 0.9) between technological factors(i.e., system quality, information quality, and after sale quality) and the adoption of next generation ILS.

2.7 Mapping of research to theoretical framework

Table 2.1 shows the alignment of the theoretical framework for this study. It aligns each research objectives and critical questions to theoretical frameworks. The TAM and UTAUT models are guided by information system theorist like Venkatesh and Momani. The TAM and UTAUT models share similar perspectives in that they have abilities of recognizing the role of humans in Information Systems (IS) infrastructure and processes and ignores the non-technical skills required by LIS professionals. However, Siguenza-Guzman Framework and Gartner Hype Cycle model are designed to aid researchers in their work as well as influence how technology is adopted and used. Table 2-1 depicts selecting a theoretical framework for the adoption and maintenance of the next generation integrated library systems at academic institutions in South Africa.

RESEARCH OBJECTIVES	THEORATICAL FRAMEWORK SELECTED	USEFULNESS TO THIS RESEARCH
To determine the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa	Unified Theory and Use of Technology Acceptance (UTAUT) model	Construction of survey instrument and interview schedule Chapter 4, 5 & 6

To identify the requirement of competencies amongst LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries in South Africa	Technology Acceptance Models (TAM)	Construction of survey instrument and interview schedule Chapter 4, 5 & 6
To determine how privacy and security is maintained in the adoption of the next ILS	Gartner Hype Cycle	Construction of survey instrument and interview schedule Chapter 4, 5 & 6
To develop a model for decision making for the adoption and maintenance of the next generation ILS in academic libraries	Siguenza-Guzman Framework for economic evaluation of libraries through a holistic approach	Construction of survey instrument and interview schedule Chapter 4, 5 & 6

Table 2-1 selecting a theoretical framework for the adoption and maintenance of the next generation integrated library systems at academic institutions in South Africa.

The purpose of the study is to explore the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa. The research objectives and critical questions as illustrated in Table 2.1 explore the role of academic libraries in the adoption and maintenance of the next generation integrated library systems in South Africa. It examines the integration of technology and adoption related to academic libraries and disruptive technology.

Therefore, Technology Acceptance Models (TAM), Unified Theory and Use of Technology Acceptance (UTAUT), Gartner Hype models and Siguenza-Guzman Framework were selected to guide this study. These frameworks and models are underpinned by philosophies in Information Systems (IS). The components of TAM and UTAUT namely, performance expectancy, effort expectancy and facilitating conditions, can assist in determining LIS professional's competencies as adopters on the next generation ILS in academic libraries. The justification of using TAM with UTAUT is to explore the extent and nature of adoption and maintenance of the next generation ILS. The elements of acceptance, satisfaction and intension to use can be investigated to understand why LIS professionals accept or reject new ICT and

the introduction of modern technologies. The elements of internal and external perspective of the library system including internal perspective of the library collection can assist LIS professionals in decision-making of purchasing or selecting the suitable next generation ILS that meets their business requirements. Finally, the Gartner Hype Cycle model can assist in providing LIS professionals with knowledge of data and security of their system and guide them in emerging technological trends in academic libraries. Hence, the study extended the UTAUT (Unified Theory and Use of Technology Acceptance) model which only had four variables. The next section presents the model of decision making for the adoption and maintenance of next generation ILS libraries in academic libraries in South Africa.

An insight into the presentation of the new model indicates that there are four major factors that influence the adoption and maintenance of next generation ILS. First a technological factor, the second are user training factors, the third are librarians' factors, and the fourth are organizational factors.

Figure 2-6 presents the model of decision making for the adoption and maintenance of next generation ILS libraries in academic libraries in South Africa.

2.8 Model of decision making for the adoption and maintenance of next generation ILS libraries in academic libraries in South Africa.

An insight into the presentation of the new model indicates that there are four major factors that influence the adoption and maintenance of next generation ILS. First a technological factor, the second are user training factors, the third are librarians' factors, and the fourth are organizational factors.

Figure 2-6 presents the model of decision making for the adoption and maintenance of next generation ILS libraries in academic libraries in South Africa.

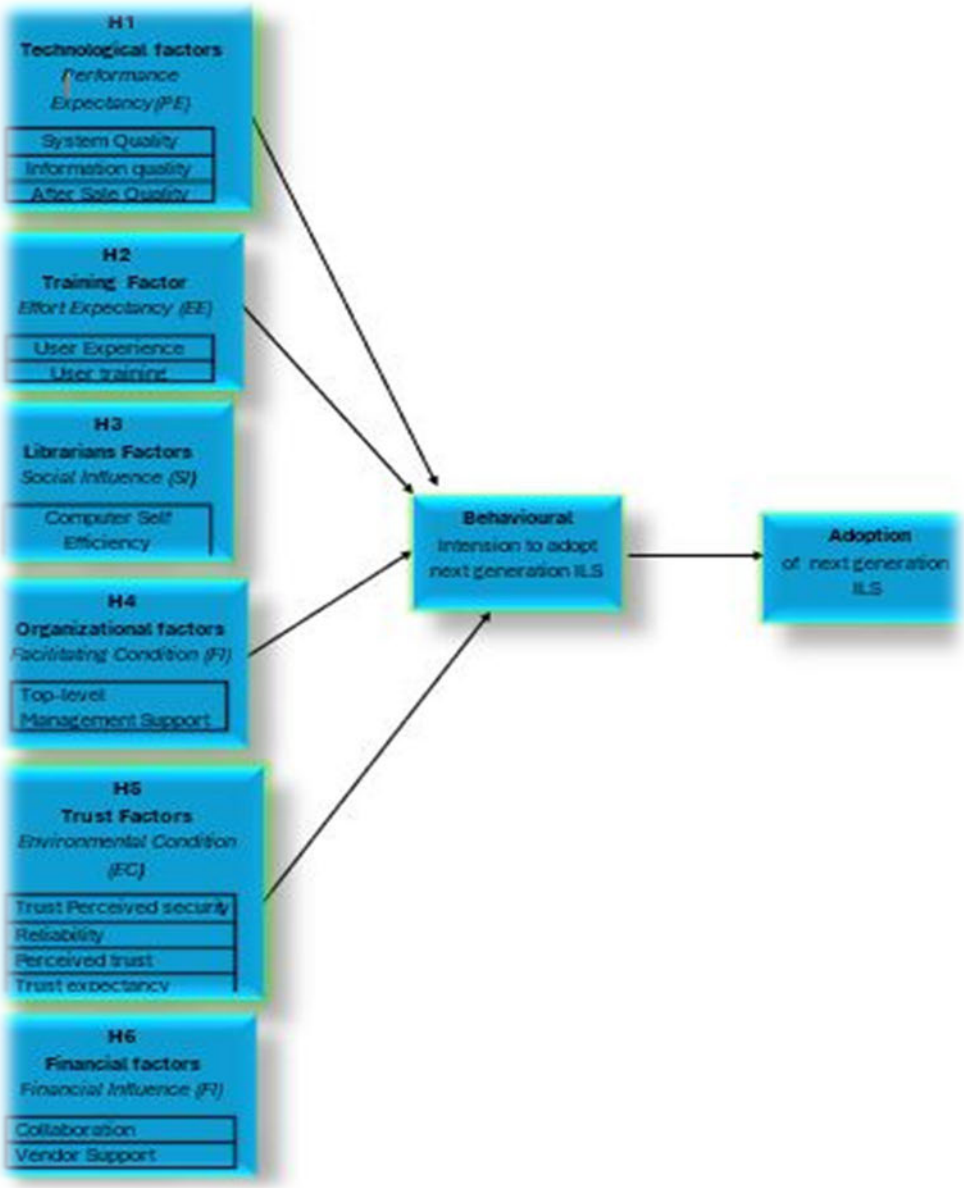

Fig 2-6 Proposed model for the adoption and maintenance of next generation integrated library system in academic libraries in South Africa

- H1 - '**Technological Factors'**, "*Performance Expectancy*" (**PE**) by LIS professionals utilizing any next generation ILS, support provided by vendors or ILS/IT service providers i.e., information security and data protection. information quality, system quality,' and after sale quality.
- H2 – '**Training Factors'**, "*Effort Expectancy*" (**EE**) will be determined by the staff and user experience from user training, use of next generation ILS, and logging onto the system till the end of their transactions.
- H3 **- 'Librarians Factors**" i.e., "*Social Influence*" (**SI**) computer self-efficiency and librarians experience. Staff accessing next generation ILS of the libraries to perform cataloguing, information retrieval (discovery tool), transactions (circulating of library material), data analysis, statistics etc., data analysis and conversation e.g., statistics etc.
- H4 - **Organizational Factors'** *Facilitating Conditions* (**FC**) – 'the desired characteristics of the specific next generation ILS in the libraries selected for this study. Specific qualities to look out for is i.e., top-level management support, staff involvement, technical infrastructure to support use of the system.

UTAUT was extended, and integrated with Siguenza-Guzman framework, TAM (Technology Acceptance Model) and Gartner Hype Cycle presented in (Chapter 6, Figure 6.2, 6.3. & 6.4), which added the two additional variables, fifth and the sixth variables is termed financial Influence (FI) and Trust Factors (EC).

- H5 - **Financial Factors** (**FI**) - '*Cost analysis factors***"** is concerned with the costs and resources of library process, services are analysed and system evaluation.
- H6 - **Trust factors** (**EC**) – **"** *Environmental conditions***"** is concerned with data and information security.

Literature review on the adoption and maintenance of next generation LS provide valuable insight into the research bias of UTAUT model. With the improvement of this factors LIS professionals are expected to adopt and maintain their library management systems (LMSs) or next generation integrated ILS.

2.9 Summary

These studies examined the relevant theoretical frameworks related to the study. The focal point of this study was the nature and extent of adoption and maintenance of the next generation integrated library systems. Different topics were explored and their relevance to the topic of adoption of next generation integrated library system and LIS professionals and academic libraries in South Africa were explained. Lastly, the researcher considered Technology Acceptance Models (TAM), Unified Theory and Use of Technology Acceptance (UTAUT), Gartner Hype models and Siguenza-Guzman framework. The position of these models and framework within the context of this study is appropriate as all can be used to develop a model decision-making for the adoption and maintenance of next integrated ILS required by academic libraries in South Africa.

3. LITERATURE REVIEW ON THE ADOPTION OF THE NEXT GENERATION INTEGRATED LIBRARY SYSTEMS

3.1. Introduction

The literature review provides a framework for the study, justifying the research, and identifying similar studies that have been conducted. The results of similar studies are shared with the reader in the literature review which identifies previous studies and provides justification for conducting the research (Creswell & Creswell, 2018). This chapter examines the body of knowledge in existing literature that is relevant to the research questions raised by the research problem, with the goal of identifying the key areas that are pertinent to the study. This chapter examines the concepts and issues involved in the decision-making process for the adoption of next-generation ILS in South African academic libraries.

The field of the study and the present research is the maintenance and adoption of the next generation ILS in academic libraries, with the aim of exploring the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa. The researcher sought to figure out what research had been done on the uptake of next-generation ILSs, particularly in university libraries. The review of the literature helped the researcher to identify and discuss various models for the adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

Since the study's focus on synthesizing a model decision making for the adoption and maintenance of the next generation library ILS in libraries at tertiary academic libraries, literature related to requirements, competencies, and skills amongst LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries in South Africa was explored. This is required to identify both the theoretical and practical elements for the building and implementation a model for the adoption and maintenance of the next generation library ILS for efficient implementation by LIS professionals in academic libraries in South Africa.

3.1. Trends and issues in academic libraries of the twenty-first Century

Most academic libraries today have evolved due to the changing needs of library users in the digital era, the emphasis has shifted from physical print collection to a suite of services incorporating innovations, teaching, technology, and social media (Gaikwad & Bilawar, 2023). Libraries experience difficulties keeping up with the rapid growth of electronic resources, journal subscriptions, staffing issues, and a decline in their status as hubs of scholarly activity (Association of College and Research Libraries, 2021) Most academic libraries are dependent on their parent organization for funding and support to effectively offer service delivery to library users. The funds allocated to libraries are utilized to purchase information material, subscribe to journals and databases, staff recruitment, promotion, and expansion of library services (Otike & Barát, 2021).

Traditionally, academic librarians have been facilitators, connecting users and the information they require for their academic needs. According to the Association of College and Research Libraries (2020), emerging staff positions include scholarly communication, digital projects, user experience, data management, technical support, digital humanities, and learning commons. The new emerging technologies in academic libraries are artificial intelligence, IOT (Internet of Things), blockchain and cloud computing (Dongare, 2022).

Globalization and digitization are some inevitable emerging trends in academic libraries. The rapid advancement of ICT can be linked to rapid change and emerging trends in academic libraries (Kiran, Aziz, & Lashari *et.al*., 2024). However, there is still a slow uptake in developing countries by LIS professionals adapting to the emerging trends (Otike & Barát, 2021). Because of innovative technology and hybrid collection, the library profession is changing, and it is critical to identify the current requirements for academic libraries. The scope of library and information services is changing dramatically alongside technological advancements, and significant changes are occurring in library and information centers, as well as the services and products offered therein (Breeding ,2020). Managing change in academic libraries requires library leadership that is well-versed in the best practices for systematically adapting their work to the needs of the entire organization (Benedetti, Boehme & Caswell 2020).

3.2 Factors to be considered when purchasing a new system in academic libraries

Due to the cost and difficulty of changing systems, libraries tend to stick with their current systems unless they have a strong vendor or product dissatisfaction, or they believe certain technologies better align with their goals (Breeding, 2019). Because most academic libraries in South Africa are not members of a consortium, next-generation ILS have been installed as individual projects in academic libraries. However, system customization is not possible through a single person, a unified purchase of a system by academic libraries is important for cost saving in purchasing a new system (Sivankalai, 2020). The next generation ILS is available on cloud; therefore, it is critical to have a stable network, as well as regular participation in discussion lists when using integrated library systems to keep up with the latest technological trends when planning to acquire a new system. According to (Breeding, 2016), next-generation ILS allows for adequate monitoring, controlling, service delivery, access to bibliographic records, collaboration with other libraries, and improved access to information materials despite patrons' geographical locations. Acquiring a new system in academic libraries necessitates greater collaboration and resource sharing among libraries due to budget cuts in higher education institutions because of the global economic and budgetary crisis. According to Adamu (2022), implementing a new system is one of the most significant and costly projects in academic libraries.

3.3 [RQ1] Extend of the adoption of next generation integrated library systems

The next generation ILS is viewed as a set of promises aimed at improving technology applications. This would seamlessly enable print and digital content. In the process, the singular strategy linked to the management of resources would group diverse and geographically distributed resources via one environment (Salih, 2020; Grammenis & Mourikis, 2020). To further clarify the concept of next generation ILS, Grammenis and Mourikis (2020) suggests "they are cloud-hosted, and new ILS structures call for greater integration of staff processes and promise greater capabilities, particularly when working with electronic resources" (Grammenis & Mourikis, 2020:3). Furthermore, to distinguish next generation ILS from previous traditional ILS, a new concept of Library Services Platform (LSP) was proposed by Kouis and Argiorgitis (2022: 291), which can manage all forms of library collections including print, electronic, and digital resources. Ocloo and King (2022) defines LSP in terms of web-

based solutions that facilitate the management of several services via a single system. Services include physical, digital and electronic capabilities.

The next generation ILS has become common in academic libraries globally. As discussed in Chapter 1, the term next generation ILS instead of LSP will be used for the new emerging systems to emphasize its integration feature and avoid any confusion it may cause because of both LPS's, and the next generation ILSs are often used in library literature and libraries. The advantage of these new systems is that they are built on architectural advances that enable multi-tenant operations, data aggregation, analytics, redundant and secure data centers; additionally, the workflows take an integrated and efficient approach by redesigning both digital and print processes into common workflows to optimize staff efficiency and effectiveness (Ocloo and KingO, 2022).

Ex Libris ALMA currently holds a larger market share in academic libraries all over the world. This cloud-based LMS is a unified library service platform that helps manage print, electronic, and digital materials in a single interface (Salih, 2020). Systems that take this approach are World Share Management Services by OCLC, Sierra by Innovations, BLUEcloud Campus by SisriDynix's, Bibliovation by LibLime, PTFS and Intota by Serial Solution (Association of College and Research Libraries, 2020). The open-source movement is another noteworthy development in the field of library technology as well as in the larger field of information technology. South African and American nations are leading the way in the adoption of open-source software (OSS) (Breeding, 2020). Open-source software has challenged commercial proprietary systems, not only for their market share but because of their greater flexibility and interoperability with other systems (Association of College and Research Libraries, 2020). A flexible open-source LMS, FOLIO (Future for Libraries is Open) offers a variety of modules that are available (and interchangeable) based on user requirements (Benedetti et.al., 2020). FOLIO is inspired by cloud technologies and by open-ended platforms: such as smartphones and operating systems (Association of College and Research Libraries, 2020). Another open-source Kuali (Open Library Environment) product that provides administrative built specifically for higher education for more than 160 institutions by utilizing modern cloud-based technologies (Pradhan, 2019).

3.4 [RQ2] library professionals' competencies in the adoption of the next generation integrated library systems in academic Libraries

Today's system librarians and other tech-related professionals still carry out the same basic tasks. The academic library environment's procedures change as technology does. Ashiq, Rehman and Mujtaba (2021) as well as Odele (2020) indicate that traditional academic librarians have been facilitators, connecting users and the information they require for their academic needs, emerging staff positions include scholarly communication, digital projects, user experience, data management, technical support, digital humanities, and learning commons. The major challenges the library is currently facing are the declining number of professionally trained and unskilled staff, the level of short staffing is apparent while the little on the ground have so little or ICT skills (Sibiya & Ngulube, 2023). Employers want LIS professionals with a diverse set of ICT skills and competencies in addition to their core (Hotsonyame, 2023).

Shastri and Chudasma (2022) emphasized that to take advantage of 'uncertain' technologies during the pandemic situation, library professionals and their users should update themselves as per technological innovation and learn to easily adapt to newest technologies. Furthermore, Ashiq *et al.* (2021:1) emphasize that it is crucial for librarians working in academic institutions to stay informed about the larger landscape of students, higher education policies, publishers, researchers, and scholarships to actively participate in this change rather than simply react to it. The adoption and maintenance of the next ILS will have an impact on the new skills that librarians will require to manage library management systems (LMS) in the future. Due to digital transformation, LIS professionals need to develop the necessary skills to carry out their responsibilities effectively (Shastri & Chudasma, 2022). This can be linked with Sibiya and Ngulube (2023) indicating that library staff in the twenty-first century are tasked with a variety of tasks, including content creation and management, knowledge management, digital curation, influencing computer literacy skills, Web design, providing mobile technology services, and media marketing. One of the common effects of technology is the ability for library staff to work on mobile, enabling them to engage more with their users or customers. To achieve the library 4.0 goals—described in the context of intelligent systems, Makerspaces, context-aware technology, Open Source, Big Data, Cloud Services, State of the Art, and

Librarian 4.0—libraries are currently developing a variety of technology (Nkiko & Okuonghae, 2021).

3.5 [RQ3] Data privacy and security

Building institutional repositories, hosting websites, allowing users to search for scholarly content, and storing files using services like Google Docs and Google Drive are all ways that libraries are changing the way they provide their services. Libraries have a long history of upholding patrons' right to privacy as a method of ensuring access to information, freedom of expression, and intellectual liberty (Shastri & Chudasma, 2022). Cybersecurity is an asymmetric challenge, which means it takes a lot of resources to guard against attacks that come from a small number of resources (Amini, Vakilmofat & Saberi, 2021). Cloud computing has developed as a forefront research channel that has an enormous storm itself that can change the face of IT industry, and this has a significant effect on the implementation and maintaining the next generation of ILS amongst academic libraries in higher education (Aydin, 2021).

There is intellectual debate over various interpretations regarding the implications of cloud computing in libraries, as Shastri and Chudasma (2022) point out that even in the scholarly domain, privacy has even fallen behind trends like learning analytics or personalized search. Shaw and De Sarkar (2020) further state that this change has come through successive cycles of organizational and technical paradigm shifts resulting in a new phase of computing architecture and deployment models. Therefore, libraries need to continually rethink the kind of work performed by their technology and support departments.

Due to the excessive cost of security and the financial and reputational losses that cloud providers face because of data breaches, many academic libraries simply cannot afford to make the security investments that cloud providers can; as a result, cloud deployments will be considered safer than on-campus deployments for many academic libraries (Thomas *et.al*., 2022). Tella and Kayode (2020) continued by citing analysts IDC and Gartner as saying that the number of software-as-a-service (SaaS) products will increase as software vendors transition from premise-licensed software to public cloud-based offerings.

Cloud security and data security are major concerns in academic libraries; therefore, it is important for researchers and scholars need to familiarize themselves with the current legislation requirements around data collection not only their own Personal Protection of Information Act (POPIA) (Personal Protection of Information Act, 2013). There is a need for collaborators in terms of General Data Protection Regulations (GDPR) adopted by European union in May 2018 as a collaborative partnership to ensure that adequate measures are in place to protect the management and transfer of personal information (Badii *et.al*., 2020). Okazaki (2020) confirms that the need to adjust library privacy practice in response to the challenges of network environment has been previously noted as a profession we have been slowly adapting to. Thus, libraries are adhering to the proposal made by Khan, Ibrahim and Hussain (2021) that data security is more crucial than system security because a secured system with corrupt data is useless.

3.6 Summary

This chapter reviewed literature on trends in adopting and maintaining the next generation ILS in academic libraries in the 21st century. Literature on diverse topics suitable for academic libraries on the scope and nature of the extent of adoption of the next generation ILS were covered. It was necessary to examine literature reflecting the trends of Library Professional adoption in the next generation ILS in academic libraries globally and in South Africa, including the LIS competencies, data privacy and security. The next chapter will focus on the methodology that was employed in this study.

4. RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

The term ‘research refers to an exploratory approach, investigating specific phenomena which are organized in a systematic manner (Khatri, 2020:1435). Philosophy of research is an important aspect of research, different scholars in the field define the term research in various ways. Chege and Otieno (2020:34) describe research as “a process of steps used to collect information to increase our understanding of the topic or issue”. In an ideal world, research would be rewarded with conclusive empirical findings. The research design is intended to

provide an appropriate framework for a study as well as a choice regarding a research approach because it determines how relevant information for the study will be obtained (Okesina,2020).

Every research methodology is found on specific ontological and epistemological commitments, the process includes systematic approaches, procedures, or tools for data collection and analysis, and is based on a paradigm or theoretical framework (Ogwu, Ekere & Ohoh, 2021). According to Khatri (2020:1436), the ontological assumptions are "questions about the nature of reality, what is real, and whether an objective reality exists apart from the researcher". In contrast, epistemological assumptions are "theories of knowledge, the nature of legitimate knowledge sources, and the ability of research subjects/participants to possess the knowledge". In information systems (IS) research because system developers must conduct research as part of systematic designs and must intervene in the social world as part of system implementation, it is natural to distinguish between two types of related assumptions. These assumptions include those associated with how system developers acquire the knowledge needed to design the system (epistemological assumptions), and those that relate to the view of the social and technical worlds (ontological assumptions) (Ogwu *et.al*., 2021).The definition of research methodology is given as a "general research strategy that defines how research should be conducted. It includes a set of beliefs and philosophical assumptions that shape the understanding of the research questions and underpin the selection of research methods. Hence, it is important for the researcher when conducting research to ensure that a choice of research paradigm is stated on the research (Okesina, 2020). The selected paradigm highlights the research approach when probing the research problem. Therefore, it becomes an integral part of the dissertation or thesis that helps to ensure consistency (Melnikovas, 2018). In terms of this study, pragmatism was the philosophical foundation chosen to understand the phenomenon.

Ngulube and Okwoma (2022) distinguish positivism and interpretivism from pragmatism as the philosophical underpinnings of MMR. When choosing a paradigm, pragmatism and transformative are thought to be the most common pragmatic positions (Shan, 2021; Hildebrand, 2023). MMR is appealing to a wide range of disciplines due to its ability to present various viewpoints on reality in a single study and its capacity to combine qualitative and quantitative methods to provide an explanatory, exploratory, and confirmatory understanding of a phenomenon in a single study (Ngulube, 2022). In terms of this study, mixed method

research (MMR) was selected to guide the design and systematic data process. Sequential design for exploration, explanatory, and convergent methods are the three types of MMR. To analyze the study's objectives, investigate the research question, and solve the problem, the researcher opted for an explanatory sequential design. The research problem addressed in the study was the next generation integrated library system in academic libraries in South Africa. The aim was to explore the extent of adoption and maintenance of next generation integrated library systems by LIS professionals. The intended outcome of this study was to develop a model for the adoption and maintenance of next generation ILS for the current LIS environment in South Africa. Therefore, the objectives of the study were as follows:

O1]: To determine the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

[O2]: To identify the requirement of competencies amongst LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries in South Africa.

[O3]: To determine how privacy and security is maintained in the adoption of the next ILS in academic libraries in South Africa.

[O4]: To develop a model for decision making for the adoption and maintenance of the next generation ILS in academic libraries.

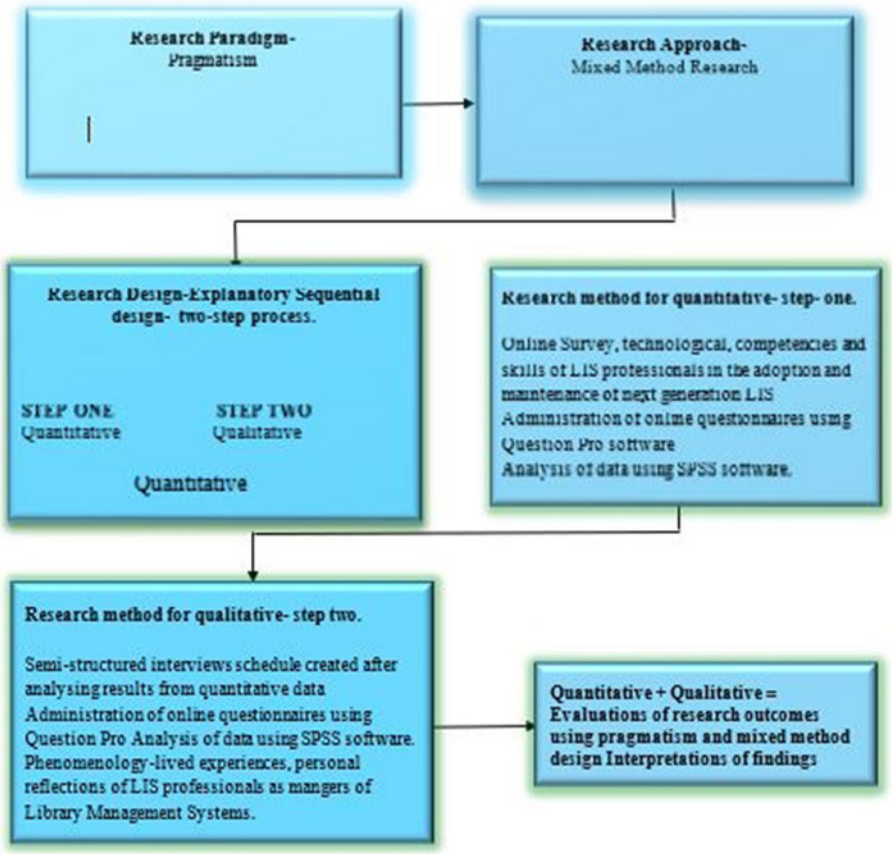

Figure 4-1 Research Methodology Roadmap for adoption and maintenance of next-generation integrated library system at academic libraries in South Africa

In figure 4-1, the researcher constructed a roadmap for the research methodology chapter of this study. The roadmap highlighted the step-by-step process when applying the explanatory sequential model to the research study. Figure 4-1 provides an overview of the systematic progression from selecting paradigms, approach, design methods, evaluation of the research outcome, resulting in interpretations and discussions of the study.

4.2 Research paradigm

Khatri (2020:1435) defines the research paradigm as "theoretical or philosophical ground". It is therefore viewed as a research philosophy. According to Yong, Husin & Kamarudin (2021) paradigms allow the development of models and theories that assist researchers with their research problems and indicate important issues challenging any disciplines. Data collection, data collections instruments and analysis tools include surveys, interviews and software.

Paradigms provide principles, procedures and methods to be considered when similar problems reappear (Kivunja & Kuyini, 2017). Therefore, selecting appropriate paradigm for an underline the methodological approach when examining the research question. In terms of this study pragmatism was chosen as a philosophical foundation to understand the phenomenon.

Research philosophy and the approach and the research approach involved influence the way a researcher chooses to go about research or to answer the research questions (Ogwu *et.al*., 2021:116). Furthermore, Ngulube and Okwoma (2021) explain that the choice of methodology in conducting research will identify the data collection methods and instruments to be used with the outlined research strategy. The researcher selected an explanatory sequential design to address the problem, examine the objectives and explore the research question for the study.

The research problem addressed in this study was adoption of the next generation integrated library systems by LIS professionals at academic libraries in South Africa. The aim was the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa. The intended outcome of this study was to develop a model of decision-making for the adoption and maintenance of the next generation ILS in academic libraries in South Africa. Once selected, the research paradigm serves as a set of researcher lenses, allowing the researcher to view the fieldwork through the lens of a specific set of established assumptions, thereby combining the abstract usefulness of the paradigm with the practical applications of conducting the research (Khatri, 2020).

The study's research design is covered in the following section.

4.3 Research design

A research design is meant to provide a suitable framework for a study. Research design is regarded as an important decision in selecting a research approach because it determines how relevant information for the study will be obtained. Okesina (2020:63) defines research designs as “plans and procedures for conducting research that range from general hypotheses to techniques for data collection and analysis”. According to Saunders, Lewis and Thornhill (2019) the research process can be presented as a many-layered onion. Melnikovas (2018: 5) describes Saunders' research onion as "an onion with different covers that can be peeled one by one from the outer cover to the inner cover, and the cycle continues until it gets to the core

of the onion," addressing data collection and data analysis. Figure 4-2 depicts the contents of the onion layers.

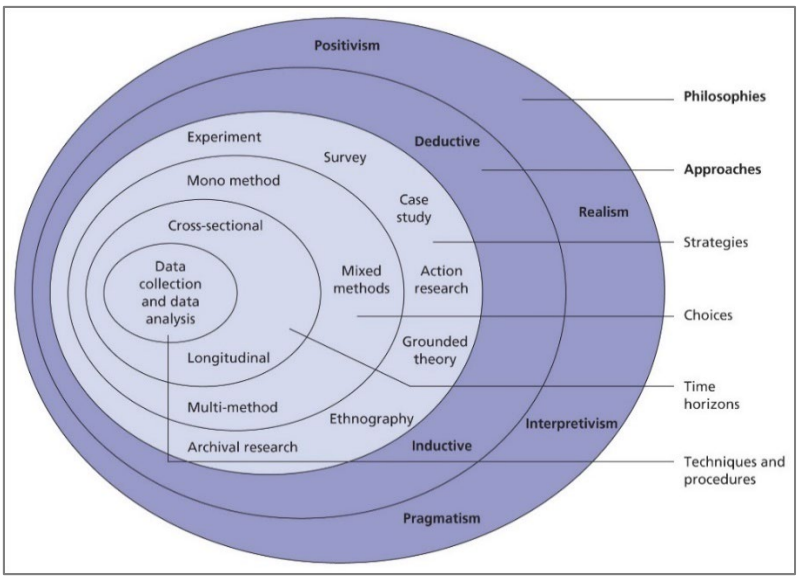

Figure 4-2 Research Onion (Saunders et al.:5 2019)

The sections that follow explain the philosophies, approaches, strategies, choice, time horizons, and technical procedures of the research onion.

4.4 Research philosophy

Research philosophy is the first and most crucial layer of the research onion (Saunders *et al*., 2019). A research philosophy addresses the beliefs, values, and principles that underpin thorough study investigation (Muhaise *et.al*., 2020:201). Furthermore, Singh (2019) states that some paradigms favor quantitative approaches, while others favor qualitative approaches. A research paradigm informs all scientific knowledge generated in IS (Information Systems). In the context of information systems (IS), a "paradigm" is defined as a "model of behavior," with the scholarly community accepting a paradigm as a solution to particular issues (Ogryzek, 2023: 6). Creswell and Creswell (2018:) identify four sets of assumptions concerning the nature of reality, namely:

- How do I know if it is true? (a question of ontology) (Khatri, 2020).
- What values go into it? (a question of epistemology) (Otoo, 2020).
- How do I write about it? (a question of axiology) (Okesina, 2020).

- What is the process of studying it? (a question of rhetoric or methodology) (Cresswell & Cresswell, 2018).

4.5 Researcher ontological stance

Ontological paradigms are theories about the existence of reality, the nature of societies, and human behavior and human behavior, among other things, whereas ontological realism states that reality exists of reality, the nature of societies, and human behavior (Otoo, 2020). Among other things, ontological realism states that reality exists of reality, the nature of societies, and human behavior (Ogwu *et.al*., 2021). Ontological assumptions concern nature and form of reality and being, as well as what there is that can be known as reality (Singh, 2019:4). Positivism believes that the world exists independently of our knowledge that it is out there waiting to be discovered (Cresswell & Cresswell, 2018). Interpretivists believe that there are multiple realities that are socially constructed and that there are various ways to access them (Okesina, 2020).

The qualitative research approach is frequently associated with interpretivists positions, whereas the quantitative research approach is typically associated with positivists positions. Thus, many believe that integrating mixed methods (quantitative and qualitative) is impossible due to the incompatibility of the underlying philosophical positions (Dawadi, Sherstha, & Giri, 2021).

4.5.1 Epistemological stance for IS (Information Systems)

The term paradigm is associated with epistemological assumptions such as positivism, interpretivism, critical realism, critical theory, and pragmatism (Yong, 2021: 5859). IS epistemology is heavily influenced by social sciences because information systems are fundamentally more social than technical systems. Thus, the scientific paradigm adopted by natural sciences is only applicable to information systems in the same way that it is applicable to social sciences (Ogryzek, 2023). Epistemological assumptions are concerned with how knowledge can be created, acquired, and transferred; it is responsible for knowledge gathering and is concerned with developing new knowledge in the form of new models or theories (Singh, 2019). The objective of this study is to explore the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

4.5.2 Axiology

As previously stated in this study, axiology is another component of the research paradigm that deals with ethical issues that must be considered during the research process. It is concerned with ethics, encompassing the roles of values in research and the researcher's stance in terms of the subject studied (Okesina, 2020). Furthermore (Khatri, 2020: 1438), states that axiology considers "what value we shall attribute to the various aspects of our research, the participants, the data, and the audience to which we shall report the results of our research". According to (Khatri, 2020) a research paradigm's axiological perspective is aimed at depicting the level of consistency, reliability, or otherwise reconstructing or extending previously held theories or constructions. In a qualitative study, the researcher acknowledges the study's value-laden nature and actively reports their own values and biases, as well as the value-laden nature of information gathered from the field (Asenahabi, 2019). Saunders *et.al.* (2019) states that there are four different philosophies: positivism, realism, interpretivism, and pragmatism. This study discussed the paradigm that formed the roadmap for the current research. Thereafter the discussion focuses on four different philosophies.

4.5.2.1 Positivist and postpositivist

Positivism epistemological level insists that the social world can be understood objectively and advocates that knowledge is gained through the collection of objectively verifiable facts through quantitative means (Ogwu *et.al*., 2021). Positivists believe that different researchers will produce similar results using the same statistical tools and following the same research process while investigating large samples, paving the way for context-independent universal generalization (Singh, 2019). At the ontological level, positivists believe in realism or a single reality, which implies that reality is objective, qualifiable, and measurable through a process reliant on the researcher's instruments (Okesina, 2020). According to Shan (2021), both positivists offer a philosophical framework that is "ontology orientated". Although post-positivism follows the same principles as positivism, it permits more interaction between the researcher and the research subjects (Ogwu *et.al*., 2021). Positivism emphasizes the objectivity of the research process, post-positivism sometimes allows for subjectivity (Okesina, 2020).

A variety of paradigms have been identified in research; widely recognized paradigms in social research include the post-positivist, constructivist/interpretivist, critical/transformative, and pragmatist paradigms as discussed previously in the study (see Section 4.2). The 'pluralism' of post-positivism strikes a balance between positivist and interpretivist viewpoints. The triangulation of qualitative and quantitative methods is encouraged by the positivist/post-positivistic paradigm, which explores the variety of facts that can be researched using different types of investigations while respecting and valuing all findings as crucial components of knowledge development (Singh, 2019). Kivunnja & Kuyini (2017: 31) presented some characteristics of some positivist paradigm:

- Because a theory is universal, generalization is possible.
- Context-independent.
- Truth and knowledge are "out there" to be found.
- Cause and effect can be distinguished.
- The research findings can be quantified.
- A scientific investigation method
- Creating and testing hypotheses.
- Using theory to predict and control outcomes.

Pragmatists frequently employ multiple and/or mixed method designs with single investigations, in an iterative programmatic manner, and across multiple investigations (Ogwu, *et.a.l.*, 2021).

4.5.2.2 Critical paradigm

The critical paradigm situates its research in social justice issues and seeks to address political, social, and economic issues that deal with oppression, conflict, struggle, and power structures at whatever levels they may exist (Kivunja & Kuyini, 2017). Critical theory critiques the paradigms of positivism and interpretivism as a way of knowing the social world. The theory challenges the oppressions and beliefs that restrict human freedom and thus seeks to bring about social change and freedom (Okesina, 2020). It is concerned with the issue of power relations within society, as well as the interaction of race, class, gender, education, economy, religion, and other social institutions that contribute to the formation of a social system

(Muhaise et.al., 2020). Critical synthesis is based on two types of methodology: criticism and synthesis. A critical stance acknowledges the existence of multiple truths (Depraetere, 2020). This paradigm is based on a transactional epistemology (in which the researcher interacts with the participants), a historical realism ontology, particularly as it relates to oppression, a dialogic methodology, and an axiology that respects cultural norms (Kivunja & Kuyini, 2017).

4.5.2.3 Interpretivism/constructivism

Interpretivists are referred to as the "constructivist paradigm". Pervin and Mokhtar (2022: 423) define "interpretivism" as an approach that emphasizes the value of people's personalities and involvement in social and cultural life. Interpretivists believe that reality is constructed by social actors providing people's perspectives on it. They prefer to work with qualitative data that contains rich descriptions of social constructs (Shan, 2021). According to the assumption (Kivunja & Kuyini, 2017), the researcher and their subjects are actively participating in an interactive process in which they converse, ask questions, listen, read, write, and record research data.

Interpretivist epistemology is transactional and subjectivist, with the researcher and subject under investigation assumed to be interactively linked. Findings are generated as the investigation progresses. (Okesina, 2020; Singh, 2019). The ontology of interpretivism is relativist and advocates that any phenomenon has multiple realities (Okesina, 2020). Case studies, phenomenology, hermeneutics, ethnography, and other methods are used in interpretivism (Singh, 2019).

4.5.2.4 Pragmatism

Pragmatism emerged from a paradigm war between two diametrically opposed world views proposed by positivists on the one hand and interpretivists on the other (Ogwu *et.al*., 202; Singh, 2019). Pragmatism is not associated with any philosophical system. Researchers are "free" to select methods, techniques, and procedures that best meet their needs and scientific research goals (Dawadi *et.al,* 2021; Shan 2021). Shan (2021) further indicates that a pragmatic philosophy enables the researcher to examine the causes that have the most influence on what we choose to research and the way we chose to do it.

The pragmatists' position is the most widely accepted as the philosophical foundation of the mixed method. Pragmatics acknowledge that scientific inquiry is contextual and that past and current social, historical, and political conditions have a significant influence on the scientific process (Ogwu *et.al*., 2021). To accomplish research goals, pragmatics uses a variety of methods, but their application should always be guided by research problems. It values both subjectivity and objectivity of knowledge (Dawadi *et.al*., 2020). Pragmatists believe that one should stop asking questions about natural laws and reality (ontology) and theories of knowledge (epistemology) and that the research questions or problem should be the central focus with the central concern being what works; and conducting research that benefits people (value driven axiology) (Okesina, 2020). Pragmatic paradigm advocates for a mixed method which is the combination of quantitative and qualitative research approaches (Ogwu *et.al*., 2021).

4.6 Paradigm choice

Critical theory critiques the paradigms of positivism and interpretivism as way of knowing the social world challenges the oppressions and beliefs that restrict human freedom and thus seeks to bring about social change and freedom as mentioned under section (4.5.2.2). This study is not concerned with the issue of power relations within society, as well as the interaction of race, class, gender, education, economy, religion, and other social institutions that contribute to the formation of a social system. Therefore, the critical paradigm was not the choice of this study. Interpretivist epistemology (Section 4.5.23) is transactional and subjectivist – interpretivists prefer to work with qualitative data that contains rich descriptions of social constructs. Pragmatism, on the other hand, aims to balance factual and rigorous knowledge, subjectivism and objectivism, and various contextualized facts (Mendling, Berente & Grisold, 2021). Furthermore, pragmatists (Section 4.1.9) associate objectivity with solidarity and agreement achieved through dialogue and transactions within and between committees (Mendling *et.al*, 2021).

Both pragmatists and constructivists agree that the outcomes of scientific investigation necessitate reflection and analysis. Furthermore, with pragmatic epistemology, researchers trained in multiple methods frequently favor equivalent status design, in which both qualitative and quantitative approaches contribute equally to the results. The results of phase one

somehow inform the results of phase two, and neither approach is viewed as more important than the other (Kivunja & Kuyini, 2017). Pragmatists, like constructivists, would encourage scholars and practitioners to engage in moral and ethical debates before, during, and after the implementation of scientific findings (Okesina, 2020). Therefore, pragmatists frequently use multiple and/or mixed method designs with single investigations as well as in an iterative programmatic manner across several investigations because of the noted epistemological continuum (Okesina, 2020). Table 4-1 below shows the comparison of the research paradigm and their components.

Paradigm	Positivist	Interpretivist	Pragmatic
Ontology	Realism or single reality	Relativist or multiple realities	Relational or non-singular reality
Epistemology	Objective	Subjective	Objective-Subjective, either or both depending on the research question(s)
Approaches	Quantitative	Qualitative	Mixed methods, or both quantitative and qualitative approaches
Design	Experimental, Quasiexperimental, Correlational, Casual comparative	Grounded theory, Ethnography, Phenomenology, Case study, Narrative inquiry	Convergent parallel mixed methods, Explanatory sequential mixed methods, Exploratory sequential mixed methods, Embedded mixed method
Methods	Questionnaire, Tests, Observation, Hypothesis testing, large samples, Probability sampling technique, Statistical analysis	Semi-structured interview, In-depth unstructured interview, Focus group, observation, document analysis, small samples, non-probability sampling techniques, thematic analysis	Mixed methods of data collection and data analysis

Table 4-1 Comparison of the research paradigm and their components (Agwu, Ekere & Onoh, 2021:121).

For this study, the researcher believes that following the pragmatic philosophy will be appropriate for conducting a deep examination of the relationship among the three variables associated with the study, namely: methodological (axiology) paradigm along with its ontological and epistemological justification to support the use of mixed method research.

The choice of a pragmatic epistemological lens for this study was based on the objectives of the study:

The four objectives (O1 – O4) of the study were:

[O1]: To determine the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

[O2]: To identify the requirement of competencies amongst LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries in South Africa.

[O3]: To determine how privacy and security is maintained in the adoption of the next ILS in academic libraries in South Africa.

[O4]: To develop a model for decision making for the adoption and maintenance of the next generation ILS in academic libraries.

Four critical questions were generated to meet research objectives:

[RQ1]: What is the nature and extent of the adoption and maintenance of the next generation library ILS in academic libraries in South Africa?

[RQ2]: What are the requirements to determine competencies among LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries?

[RQ3]: How is privacy and security maintained in the adoption of the next ILS in academic libraries?

[RQ4]: What model can be developed for the successful adoption and maintenance of the next generation ILS in academic libraries?

The research questions are primarily focused on exploring the nature and of the adoption and maintenance of next-generation integrated library systems (ILS) in South African academic libraries. This study does not support the positivists epistemological position, which holds that there is only one objective generalizable explanation for truth. According to Ogwu *et.al*. (2021:121), pragmatism allows researchers to focus on the factors that most influence their research topics and methods. Critical questions generated from the objectives favor pragmatic study which led to multiple explanations. This study analyses the adoption and maintenance of the next generation of ILS by LIS professionals. The researcher aimed at working directly with LIS directors and professionals in developing a model for decision-making for the adoption and maintenance of the next generation ILS.

Mixed methods research demonstrates the methodological value of pragmatism in science. The pragmatic paradigm holds that relationships serve as the foundation for epistemology and that the researcher selects what is pertinent to the subject of study (Ogwu *et.al*, 2021). According to Ngulube (2022), this suggests that a more complete picture could be obtained than would be possible with a single method. Therefore, a deeper understanding of the research problem can be provided by the mixed approach used in pragmatism (Shan, 2021).

In the context of human-computer interaction, pragmatism is defined as Dewey's work in which theories of experience have solidified as central theoretical framework points (Dixon, & Eklund, 2023:5). The work of Hildebrand is also connected to pragmatism as a paradigm; according to Hildebrand (2023:2), "using pragmatism has good grounds for applying the methods that have proven successful in the technoscientific disciplines of social science". Several scholars have also emphasized that a pragmatist orientation directs our attention to how information systems can change the way people work and organize (Mendling et.al, 2021). This alignment is also apparent in the TAM, UTAUT and Gardner Hype Cycle models and supported by Siguenza-Guzman framework selected for the study, underpinned Hickman technological approaches. Moreover, theories shared similar views in the context of Dewey

theories of art and education can assist our field with democratic concerns (Hildebrand, 2023). According to Breeding (2019:2), "the key objective around integrating technology to improve the work is grounded in an in-depth understanding of all the library strategy and operations, on knowledge of the technologies that exist, and on technical skills to shape technology around the needs of the library. Therefore, LIS professionals in an educational context with a technological identity to reflect upon their own skills and competencies in the adoption and maintenance of emerging technologies must be framed through pragmatism

4.7 Research approach

The second layer of the research onion design by Saunders *et.al* (2019) is research approach. A research approach is a method of logically connecting the research question's dependent and independent variables (Ganesha & Aithal, 2022:3). Ganesha and Aithal (2022: 5-7) further state that the research approach consists of three main types namely: deductive, inductive and abductive approach:

- *Deductive Approach.* The emphasis is on using literature to identify theories and ideas that the researcher would evaluate with data.
- *Inductive Approach*. In contrast, the inductive approach entails gathering data and developing theory based on data analysis results.
- *Abductive Approach*. Reviewing existing theories and identifying anomalies (unanswered/unexplained).

The main goal of the inductive analysis is to free itself from the constraints imposed by structured methodologies and allow research findings to emerge from frequent, dominant, or significant themes inherent in raw data.; in contrast, key themes in deductive analysis, such as those used in experimental and hypothesis testing research, are frequently obscured, reframed, or left invisible due to the pre-conception in the data collection and data analysis procedure imposed by the investigator (Patel & Patel, 2019: 49). Moreover, abductive research approaches do not require the formulation of hypotheses when creating research questions, according to Patel and Patel (2019). According to Malhorta (2017: 172) some of the goals driving the development of the general inductive analysis approach are as follows:

- To condense the extensive and varied raw data text rather than providing a brief, summary context.
- To establish clear links between the research objectives and the summary findings derived from the raw data to ensure that the links are both transparent (able to be demonstrated to others) and defensible (justifiable given the research objectives).
- develop a theory model about the underlying structure of experiences or processes that are evident in the data.

Furthermore, the more observations that show a relationship between two phenomena, the more likely the general statement is true; inductive reasoning works in the opposite direction, moving from a specific observation to broader generalizations and theories (Malhotra, 2017). Informally, we call this a "bottom-up" approach because the conclusion is likely to be based on premises that are uncertain. Figure 4-3 describes an example of an inductive research approach.

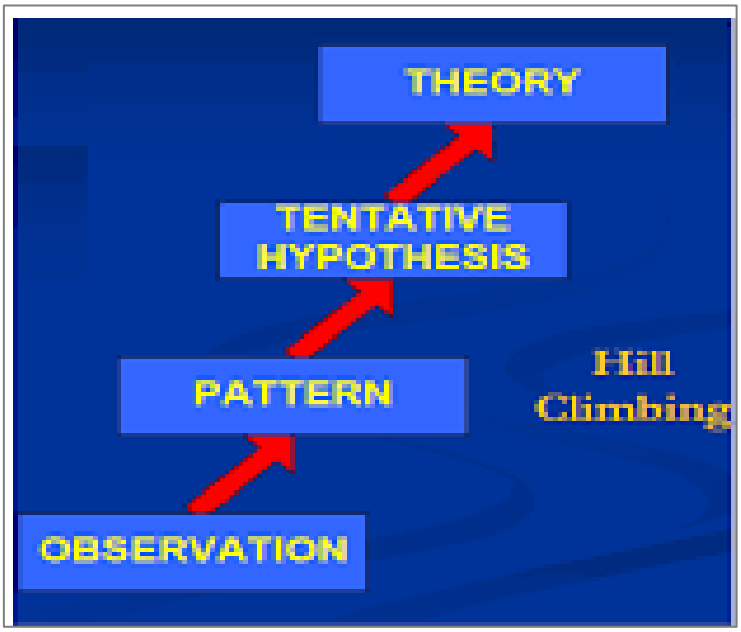

Figure 4-3 Inductive Research Approach (Malhotra, 2017:173)

This study will employ inductive reasoning. This is primarily because the inductive approach tends to lead to the development of a conceptual framework, which may take a form of a (conceptual) model. This study, therefore, focused on developing a model for decision-making for the adoption and maintenance of the next generation ILS in academic libraries.

4.8 Research strategy

The third layer of Saunders *et.al*. (2019) research's onion is research strategy. After determining the inductive orientation as the current research approach to collect a sizable population efficiently and economically, the question to be considered is whether the current study should be described as exploratory, normative, or descriptive. A research strategy is defined as "a general way to assist the researcher in choosing main data collection methods to answer the research questions and meet the research objectives" (Abdelhakim & Badr, 2021: 105); consequently, three main research strategies can be distinguished: descriptive, normative (prescriptive), and explorative.

Melnikovas (2018: 11) identifies three primary research strategies as follows:

- *Explorative methods*. Aimed at studying multiple features and exploration of developments.
- *Normative (Prescriptive) methods*. To create a desirable/undesirable future and create pathways or a chain of events to get there.
- *Descriptive*. To describe the exact pattern of future development, as well as what the future will look like.

This study employed a descriptive method because it is aimed at studying to describe the exact pattern of future development, as well as what the future will look like. In addition, Saunders *et al*. (2019) propose that the main research strategies are experiment, survey, archival research, case study, ethnography, action research, grounded theory, and narrative inquiry; however, research strategies in the field of futures studies can be distinguished in a slightly different, various strategies are described such as:

- *Experiment*. Experiments are commonly used in exploratory and explanatory research to answer 'how' and 'why' questions.
- *Survey*. The survey strategy is commonly used in the social sciences to investigate the individualities and interrelationships of psychological and sociological variables empirically.
- *Archival data*. It is associated with data collection and storage for future use.
- *Case Study.* It is used to investigate practical phenomena in a real-life situation.

- *Anthropology.* Narrative inquiry is widely accepted as a useful strategy for guiding qualitative research.
- *Grounded theory.* It is concerned with collecting a logically reliable set of data and investigating actions to discover or develop theory.

Ponto (2015:168) define survey research as:

"*The collection of information from a sample of individuals through their responses to the questions*."

Survey research will be used in this study. This type of research allows for a variety of methods to recruit participants, collect data, and use various methods of instrumentation; it can be used for quantitative research strategies (e.g., using research and numerically related items) or both strategies (i.e., mixed methods) (Ponto, 2015).

This study will use a mixed-method approach (as discussed in detail in section 4.9.2).

4.9 Research methods

The fourth layer of the onion of Saunders et al. (2019) research is research methods. The research method is classified in literature as a quantitative, qualitative, or mixed method. Several factors, including research questions, objectives, and topics determine the best research method for the study. Research methods are referred to as research choices. Vaughn and Jacques (2020:2) describe it as a method of generating or gathering data. Mixed method research has emerged as the third methodological movement to complement the existing quantitative and qualitative trends. Because of the complexities of social phenomena, IS research necessitates the development of new methods for scrutinizing research problems and analyzing data to explain and clarify them Melnikovas (2018). Quantitative, qualitative and mixed methods are discussed below.

4.9.1 Qualitative and quantitative approach

Research methodologies are frequently divided into three categories: mixed, qualitative, and quantitative. Research paradigms are thought of as the researcher's belief about the best way to conduct research and the desired results (Mulisa, 2021). The philosophies that direct and specify the procedures used in data collection are known as methodology (Dawadi *et.al*., 2021). This decision will also affect the development and use of research instruments, the researcher's objectives, and the search for a solution to the problem that the researcher is examining. (Okesina, 2020). The term epistemology describes knowledge, the theory of knowledge, or the researcher's method of knowing reality (Yong *et.al*., 2021: 5858). Furthermore, because they support the researcher's faith in the data gathered, both qualitative and quantitative research are crucial from an epistemological standpoint (Khatri, 2020). Qualitative and quantitative research methods are incompatible in the sense that each has its own unique way of gathering and analysing data; all definitions, criticisms, arguments, and counterarguments made by authors about the research approaches focus solely on the method of data collection, analysis, and results summary (Okesina, 2020). Fundamentally, they differ in terms of the study's objectives, variables measured, and data analysis. The fundamental distinction between qualitative and quantitative research is discussed in detail on Table 4-2.

Qualitative	Quantitative
Naturalistic and uncontrolled observation. Controlled and obstructive observation.	Controlled and obstructive observation
Subjective in nature, findings can be influenced by the researcher's attitude and interest.	Objective in nature, no chance of influence by the researcher
Emphasis is on causes, meanings, interpretations, and implications.	Emphasis is on precision in describing events, quantitative scores, measurement and statistical and mathematical analysis.
Conducted on a small scale means a small number of populations.	Conducted on a large scale, i.e., large number of populations.
Focusing on words, behavior and natural setting.	Focuses on number, meaning and controlled setting.
Process and meaning oriented.	Product and result oriented.
Flexible and holistic in nature.	Rigid and specific in nature.

Discovery oriented, and the approach is inductive	Verification oriented, and the approach is deductive.
Analysis proceeds by extracting themes or generalizations from evidence and organizing data to present a coherent and consistent picture.	Analysis proceeds by using statistics, tables, charts and analysis, showing the variables' relations to hypotheses.
Examples: phenomenological, ethnographical, heuristic, case studies, historical studies, philosophical studies and so on.	Examples: experimental, quasi-experimental, surveys, co-relational studies and so on.

Table 4-2: Qualitative vs Quantitative Approaches (Kandel, 2020:4)

The literature was examined further, and the researcher presents the philosophical underpinnings and characteristics of quantitative and qualitative approaches in (Section 4.4.2). The researcher used Table 4-2 to construct and discuss the differences in methodologies and data collection methods at this point in exploring research approaches from a quantitative and qualitative position. A stimulating discussion about the methodologies used in the quantitative and qualitative approaches is discussed in (Section 4.9).

The research philosophy (paradigm) that the researcher follows influences and determines the type of research methodology that the researcher uses (Mulisa, 2021). Quantitative research is defined as an objective approach which is "a method for testing objective theories by investigating the relationships between variables" (Taherdoost, 2022:117). Furthermore, Mulisa (2021:18) states that despite the fundamental validity of this assumption, not all quantitative studies—such as surveys—test theories or validate hypotheses. On the other hand, qualitative research is defined as "a subjective approach that includes examining and reflecting on perceptions in order to gain understanding of social and human activities" (Elliot, 2018:8).

Quantitative and qualitative approaches also present different methodologies. Quantitative approaches use nomothetic methodology, whereas qualitative approaches typically use idiographic approaches. idiographic methodology is focused on the individuality and uniqueness of each case or phenomenon examined, whereas nomothetic methodology seeks to identify general principles, laws, and theories that can explain behavior across a larger population or set of cases (Dzwigol, 2022). A larger sample of participants can be gathered for data collection using the quantitative approach, which increases the likelihood that the findings can be applied to a larger population. However, the qualitative approach respects

participant voice and offers a deeper understanding of the problem under investigation (Dawadi *et.al*., 2020). According to (Ogwu *et.al*, 2021) the researcher methodology is informed by ontological assumptions, which in turn inform methodological approaches, including design and data collection techniques. When employing a quantitative approach, the methodology is focused on gathering information using tools like surveys and questionnaires to test a hypothesis. But when using a qualitative approach, researchers typically use focus groups and interviews to delve deeper into the participants lived experiences in relation to the research question (Kandel, 2020; Okesina, 2020)

Quantitative and qualitative approaches differ in the research methods that are applied. Even though both quantitative and qualitative approaches sample population, there are differences. Individuals who represent and reflect a particular community may be used in quantitative approaches to sample a population (Staller, 2021). On the other hand, the researcher aims to attain a representative sample of participants chosen at random. This is accomplished through empirical research, which uses quantitative measurement techniques and research instruments to produce results that are both nomothetic and broadly applicable to the research population (Dzwigol, 2022). Furthermore, according to (Elliot, 2018) qualitative researchers begin with self-assessment and reflections about themselves as situated in a historical context, which is a highly self-aware acknowledgment of the social self, or a research project. Therefore, qualitative research approaches purposive sampling to understand the research problem. Purposive sampling is also regarded as subjective or judgmental sampling and often used on qualitative research where the sampling is very small and specific (Andrate', 2021). This approach seeks to gain a thorough understanding of the unique context and conditions of each case, as opposed to attempting to draw general conclusions that can be applied to larger populations (Dzwigol, 2022).

A mix-method approach is the extension or replacement for quantitative and qualitative methods or approaches to data collection analysis; mix-method involves a combination of the two methods (Dawadi *et.al*., 2021).This study is a combination of both qualitative and quantitative research approaches.

4.9.2 Mixed method strategy

Mixed Method research (MMR) is defined by Dawadi *et.al.* (2021:27) as distinct research methodology. It also structures the method used to collect and analyze data when designing data procedures. Taherdoost (2022) states that mixed methods use a combination of qualitative and quantitative approaches depending on the study and the nature of the research questions to provide a deeper knowledge of the topic. The rationale for combining approaches is that neither qualitative nor quantitative approaches can fully capture the trends and more information of a situation on an individual basis. The complementary nature of MMR researcher methods helps to compensate for each other's shortcomings in terms of study complexity. Ngulube (2021) further state that while the application of MMR in LIS research is limited, it overcomes paradigm incompatibility and the incommensurability thesis by combining quantitative and qualitative methods into a single study "for breadth and depth of understanding and corroboration." The current study investigates the complexity of managing next generation integrated library systems (ILS) by LIS professionals. With quantitative analysis, the researcher was able to identify correlations between variables, but they were unable to provide an explanation for the associations. The quantitative phase of the study was used to explain the factors underlying the broad relationship regarding the aspects of next generation ILS. To minimize subjectivity and ensure reliability and the possibility of further discussions, quantitative research findings are based on conclusions (statistical generalization) and qualitative contextual understanding (Creswell, 2021). Therefore, the findings of the exploratory Web survey questionnaire (refer to 4.10.5) can be triangulated with the findings from the interviews. The Web survey of LIS professionals was guided by the theoretical framework and underpinned this study (refer to Chapter 2), the researcher review of literature in Chapter 3 and her needs to determine the prevailing state on the next generation ILS in academic libraries in South Africa, whereas the interviews LIS professionals and LIS directors perspectives on the next generation integrated library systems aspects pertaining to the adoption, maintenance as library management systems. Gunasekare, (2015:364) pointed out key decisions in choosing a mixed method design:

- Identifying the degree of interaction between the quantitative and qualitative strands.
- Choosing the priority order for the qualitative and quantitative strands.

- Determine the timing of the qualitative and quantitative strands.
- Determine where and how the qualitative and quantitative strands will be combined.

Following a discussion of key elements in mixed-method study design. Taherdoost (2022: 60) describes six main categories of types of mixed method. The six main types of mixed methods include:

- *Sequential explanatory strategy.* Is a popular mix-method design strategy that frequently appeals to researchers with strong quantitative skills. It is distinguished by the collection and analysis of quantitative data in the first phase of research, followed by the collection and analysis of qualitative data in the second phase, which builds on the findings of the first phase.
- *Sequential exploratory strategy.* The phases are reversed in this strategy, which is like the explanatory sequential approach. It consists of a first phase of qualitative data collection and analysis, followed by a second phase of quantitative data collection and analysis that expands on the first qualitative phase's findings.
- *Sequential transformative strategy.* This final stage includes two distinct data collection phases, one after the other, as in the first two strategies. –It is a two-phase project in which the two consequential procedures are examined theoretically (e.g., gender, race, social science theory). It, too, begins with a qualitative or quantitative phase, followed by a second phase that builds on the first.
- *Concurrent Triangulation Strategy.* Triangulation that occurs concurrently and is the most well-known of the six options. This model combines quantitative and qualitative methods to compensate for the weaknesses inherent in one method with the strengths of the other (or conversely, the strength of one adds to the other). The qualitative and quantitative are used concurrently in this approach.

- *Concurrent transformative.* It is a two-step procedure that takes social science theories, gender, and race into account. Examining a problem is the goal of the theoretical lens that appears in the introduction section. This problem may fall under one of several categories, including social issues like injustice and inequality, and its initial stage may be qualitative or quantitative. One of the two approaches may also be used in the second phase, which is predicated on the first.
- *Concurrent Embedded Strategy.* It is distinguished using a single data collection phase during which both qualitative and quantitative data are collected concurrently. A concurrent embedded model, as opposed to a traditional triangulation model, has a primary method that guides the project and a secondary database that plays a supporting role in the procedure.

According to Taherdoost (2022: 60) the six types of mixed methods include key elements of convergence, explanatory and exploratory sequential design which include advanced MMR method of concurrent triangulation, imbedded and transformative strategies. This study will use sequential explanatory strategy, the researcher will start with the first phase quantitative approach, and the second the qualitative one. The study follows a mixed method approach; the choice of mixed methods design is discussed in the following section

4.9.3 Mixed methods choice of study

Pragmatists frequently employ multiple and/or mixed method designs with single investigations, in an iterative programmatic manner, and across multiple investigations (Cresswell, 2021). According to Dawadi et al. (2021:11) mixed methodology in a pragmatic paradigm can use a suitable combination of quantitative and qualitative methods depending on the nature of the study. Şahin and Öztürk (2019: 305) developed a seven-step process to enable researchers to select the best design for their studies. Figure 4-4 illustrates the mixed method research process. Therefore, the researcher considered the following when selecting the most appropriate research design.

- various mixed method design (as discussed section 4.9.2).
- generic as described in the mixed method literature.
- A seven-step process is explained to select the most appropriate mixed method design for this study.

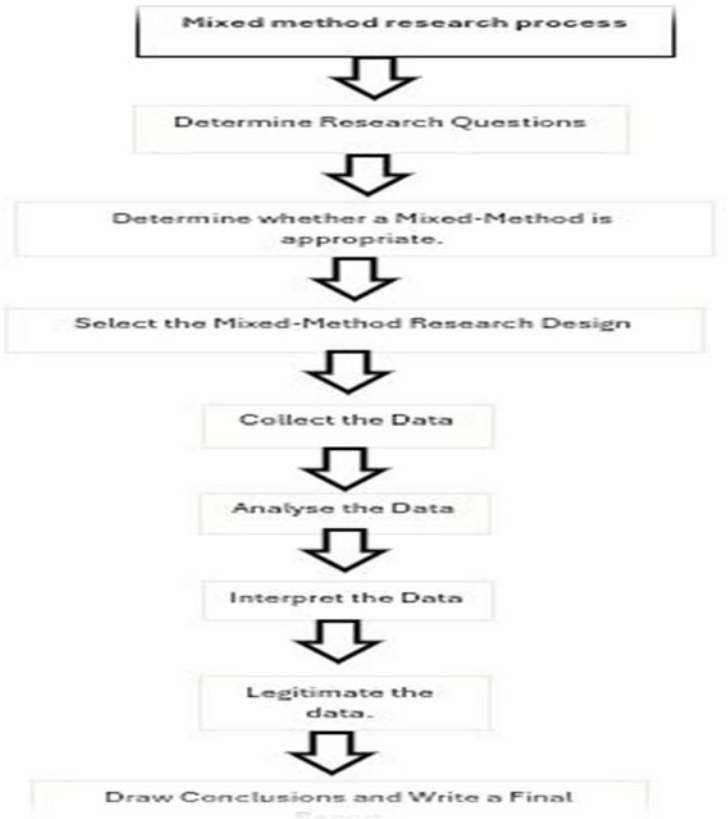

Figure 4-4 Mixed method research process (Şahin and Öztürk, 2019:305)

Data from various sources such as literature, online web questionnaire and semi-structured online interviews with LIS directors were integrated in the study during the analysis and interpretation stages. During the analysis and interpretation stages of this study, equal weight was assigned to each phase. In the first (quantitative) phase of the study, equal weight was assigned to the exploration, investigation, and explore the extent of adoption of next generation ILS by LIS professionals in academic libraries. To fully comprehend their shared knowledge and lived experiences in managing next-generation ILS, the researcher sought to interact directly with LIS directors during the second phase of the study. Objectivism and subjectivism are both supported by pragmatics. At this point, the researcher reiterated the rationale behind selecting pragmatism as the philosophical foundation for the investigation. It is an action-oriented approach. It employs impartial, useful procedures that combine data. As a result, the research objectives, questions, and context of this study were framed using pragmatism as the epistemological lens.

The mixed method design, generic criteria and seven-step process in selecting the most appropriate mixed method design within the context of the study. The MMR in this study is *'explanatory sequential mixed method'.* This study involves a two-phase process in which the researcher used a Cronbach alpha through an online questionnaire for the first phase. Initially, the results for quantitative data were analysed and statistically presented. Thereafter, inferential statistics in the form of correlations and multiple regressions were computed using SPSS Version 29 0.0.0 (241) with the quantitative data. The quantitative results were analysed further using descriptive and inferential statistics, including regression tables. The empirical data gathered through online web questionnaire, literature and theoretical frameworks guided the researcher on the types of questions to LIS directors for the semi-structured online interviews for the second qualitative face of this research. As a result, in the mixed method design of this study, both empirical and phenomenological approaches carry equal weight. The next section discusses the research context.

4.10 Research context

The research context provides lenses through which to view the study, its methodological approaches, arguments, findings, conclusions, and recommendations. This section includes research setting, population, and sampling.

4.10.1 Research setting

The study involves the twenty-six public universities in South Africa that work with or manage next generation integrated library systems located across all nine provinces of South Africa -twelve traditional universities, eight comprehensive universities, and six universities of technology. According to Universities South Africa (2020:4), South Africa has twenty-six public universities spread across all nine provinces. Every province has at least one university, Mpumalanga and the Northern Cape are the newest universities, both acquired their own universities in the past ten years, between 2014 and 2015. The largest universities are in the provinces that house the three major metropolitan centers, namely Gauteng, KwaZulu-Natal, and the Western Cape. The twenty-six public universities are listed below:

- University of South Africa.
- University of Johannesburg
- University of Witwatersrand
- Tshwane University of Technology.
- University of Pretoria.
- Vaal University of Technology.
- Sefako Makgatho Health Science University.
- North-West University.
- University of Limpopo.
- University of Mpumalanga.
- University of Free State.
- Central University of Technology.
- Sol Plaaitjie University.
- University of Venda.
- University of Zululand.
- University of Kwa-Zulu Natal.
- Durban University of Technology.
- Mangosuthu University of Technology.
- Walter Sisulu University.
- University of Fort Hare.

- Rhodes University.
- Nelson Mandela University.
- Stellenbosch University.
- University of the Western Cape.
- University of Cape Town
- Cape Peninsula University of Technology

4.10.2 Population

The population is defined as “the complete number of components, organizations, individuals, or items that are chosen to be measured as the sample of the study” (Kindy, Shah & Jusoh, 2016:895). A population is the entire group about which you want to draw conclusions in your research (Stratton, 2021: 373). In situations where there are few relevant cases, the researcher can survey every case within a given population. Surveying all the cases in a population is called undertaking a census. Census data is commonly utilized for a variety of purposes in government and institutional planning, including resource allocation and policy making. Baffour, King and Valente *et.al.* (2013) states that the purpose of a census is to provide users with pertinent population data that fits their context. Consequently, the quality and definition of this data must match users' expectations. The target population for the first phase of the research design in this study, the online web-survey included LIS professionals (a census) from the originally identified academic libraries from 26 public universities in South Africa managing next generation integrated library system (ILS). The target population included technical services, user services, IT department, information services and faculty support services department.

The researcher contacted all the public universities telephonically and via email to confirm the number of LIS professionals using next generation ILS for management of their library information resources. The total number of LIS professionals involved in the management of the next generation ILS at the time of the contact was 250. The link to the online survey was only distributed via email once the ethical clearance letter, gatekeeper’s permission and necessary documentation were completed by the researcher and authorized by each host institution. The information about the number of LIS professionals managing the next generation integrated library system was obtained through LIS directorate office from 26 public universities.

The number of participants answering the web-based survey was known to the researcher, though. Participants received frequent reminders to finish the survey. Of twenty-six public universities, seventeen participated in the survey and eight did not consent to the participation of the survey and after attempts to reach the university ethics department. Most of universities have unclear processes of external applications researchers to conduct research in their

institutions. Ethical clearance was received institutionally from some universities but declined by libraries due to large request received from LIS researchers and postgraduate permission to conduct their research studies for 2022. Therefore, this universities were excluded in the study. First, this was sent out once a month; then, it was out every two weeks, and in some cases, once a week, kindly asking respondents to finish the survey. Before the commencement of the Web survey, 174 participants' consent to the online Web survey were received, but only 91 participants managed to complete the survey.

The participants of the first phase of the study included 91 LIS professionals from 17 public universities in South Africa managing and working with next generation integrated library systems complete the survey. The exploratory Web survey (discussed in more detail in Section 4.5.5) was administered from 1st October 2021 – 27th July 2022. Since the link to the survey was sent via email and led to the online web-based survey, the researcher had no control over the participants. As a result, the answers were kept anonymous during the entire survey.

An analysis of the exploratory Web survey indicated that all seventeen academic libraries in public universities are using next-generation integrated libraries system as their library management systems in managing their information resources. This included.

- University of Johannesburg.
- University of Witwatersrand.
- University of South Africa.
- Vaal University of Technology.
- North-West University.
- University of Limpopo.
- Central University of Technology.
- Sol Plaaitjie University.
- University of Venda
- University of Kwa-Zulu Natal.
- Durban University of Technology.
- Mangosuthu University of Technology.
- Walter Sisulu University.
- University of Cape Town.

- University of the Western Cape.
- Cape Peninsula University of Technology.
- Nelson Mandela University.

Eight Universities that did not consent to the participation of the survey were excluded in the study included:

- Tshwane University of Technology.
- Sefako Makgatho Health Science University.
- University of Pretoria.
- University of Mpumalanga.
- University of Free State.
- University of Zululand.
- University of Fort Hare.
- Rhodes University.
- Stellenbosch University.

Semi-structures interviews were conducted with twelve LIS Directors from these institutions who indicated via the Online web-survey that their senior management managing next generation integrated ILS. The data from the online web survey, as well as the literature reviewed for this study, guided the sampling process for the study's interviews, as well as the design of instruments used for data collection in the interviews.

4.10.3 Sampling

Sampling is the process of selecting a subset of a population to represent the entire population (Kindy *et.al*., 2016:896). Sampling strategies can be complex while consolidating the quantitative and qualitative approaches. Sampling in Mixed Methods Research (MMR) is determined by the study's research design (mentioned in Section 4.). The sample size is determined by the optimal number needed to draw conclusions from the population (Eitekan, 2017; Taherdoost, 2016). In qualitative research approaches, participants are not chosen at random (non-probability sampling), but rather purposefully chosen to include the most suitable participants in the most suitable setting to respond to the research questions (Johnson, Adkins

& Chauvin, 2020). However, in probability sampling, the researcher randomly selects participants to obtain a representative sample (Staller, 2021).

MMR sampling is limited to the basic qualitative and quantitative methods, regardless of the form of integration (as discussed in Section 4.4.2 and 4.4.3). According to Mwesi and Sakyi (2020) probability sampling is usually used in quantitative research and may also be used in quantitative of mixed method research of what is described as triangulation. Based on the design of this research, it is a pragmatic mixed method research approach, deductive research, with survey strategy and cross-sectional time horizon, accordingly, probability sampling method was used in this study. Probability sampling techniques include simple random, systematic, stratified random, cluster, and multi-stage sampling (Kindy *et.al*., 2016:). The researcher must select the most appropriate sampling technique to determine the sample size needed for a study. Etikan and Bala (2017) state that probability representative sampling is mostly used in survey research strategies. The sampling technique used was probability cluster sampling strategy. In cluster sampling, it is where the whole population is divided into clusters or groups, subsequently, a random sampling is taken from clusters, all which are used in the final sample. Taherdoost (2016) further states that cluster sampling is advantageous for those researchers whose subjects are divided over huge geographical areas as it saves time and money. Mwesi and Sakyi (2020) argue that this strategy is great for managing huge and dispersed populations, but there is more chance of error in the sample, as there might be significant differences between clusters, and it can be difficult to ensure that sampled clusters are representative of the whole population.

For this study cluster sampling will be utilized, the population is spread in a wide geographic area, and the method of collecting data and analysis was both quantitative and qualitative approach. The population for the first stage of the study, that is the online Web survey was 250 LIS professionals from 26 public universities in South Africa. Of twenty-six public universities, seventeen participated in the Web survey and eight did not consent to the survey's participation after attempts to reach the university ethics office. The participants of the first stage were reduced to 173 LIS professionals from 17 public universities, and only 91 participants managed to complete the survey (refer to Figure 4.6). The prime advantage of cluster sampling is that it can do an excellent job of reducing the size of a very huge population

down to something more manageable without ruining the researcher's capacity to gather a representative sample.

Due to the integrated mixing method, the implementation of the second, qualitative phase depended on the results from the first, quantitative phase. At the design stage of this study, it was decided by using semi-structures interviews to interview LIS directors who indicated that they have adopted next generation ILS as their library management systems in their libraries, LIS directors were selected because they were prepared to share their life experience in this phenomenon. In this case, the population was distributed over a large geographical area across nine provinces in South Africa, and the data collection and analysis are based on mixed-method research methodology that does not necessitate a face-to-face interview to collect data. Therefore, the data collection process was carried out online, over the Microsoft Teams, and via email for distribution of questionnaires.

4.10.4 Instruments used in data collection

The previous section was built up from research context to research settings. This research section, as indicated in Figure 4.1 on the roadmap, is where the chosen research methods shaped the data collection process using the qualitative and quantitative approaches. According to Dawadi *et.al.* (2021) mixed methodology in a pragmatic paradigm can use a suitable combination of quantitative and qualitative methods depending on the nature of the study. MMR divides methodology into quantitative and qualitative methodologies and therefore, quantitative methods require countable objects of research, while quantitative methods describe and interpret its research objects (Stoecker & Avila, 2021). The division of these strands becomes visible as the data is generated and analyzed in the study. In Figure 4-5, the researcher constructed how these data collection instruments are associated with the quantitative and qualitative approach in MMR design, from the literature reviewed.

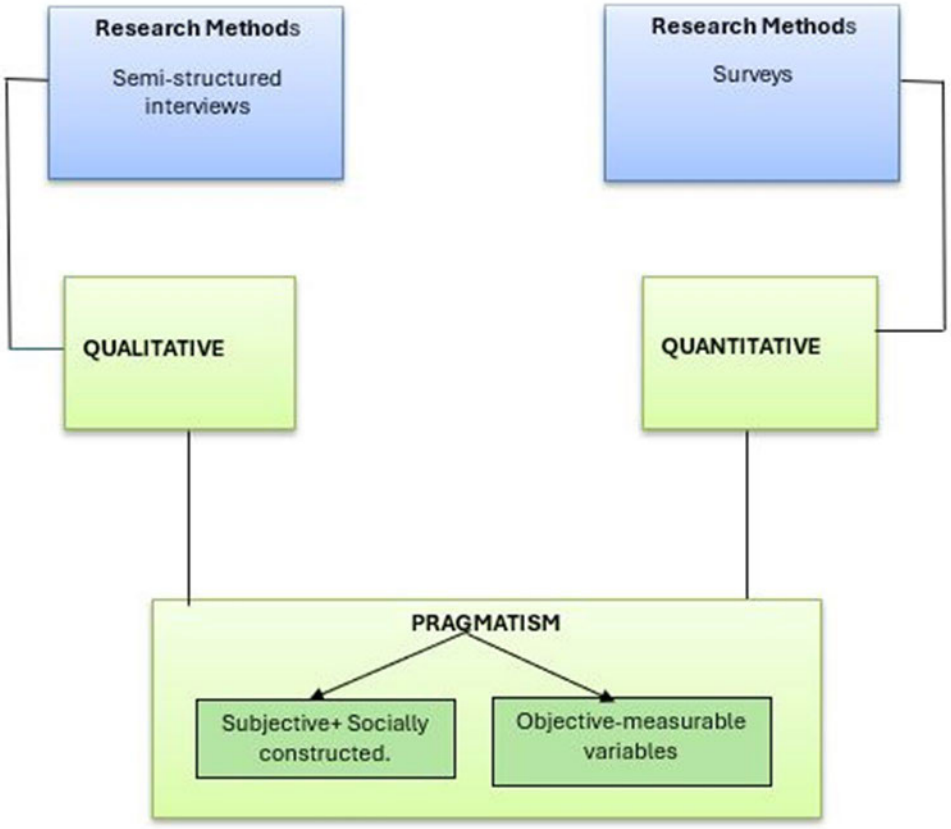

Figure 4.5: Research methods, quantitative and qualitative data

Research methods are related to quantitative or qualitative approaches Vaughn and Jacques (2020:2). Mendling *et.al*. (2021) states that pragmatism aims to adjust factual and rigorous knowledge, subjectivism and objectivism, and different contextualized facts. The subjectivity of subjective research describes how individuals feel or what they think about a specific subject, situation, phenomenon, or event but the objectivity of quantitative research methods is concerned is aimed at quantifying things in terms of statistics and numbers and are quantifiable. Subsequently, the true distinction between quantitative and qualitative is seen in the type of data used (Mulisa, 2021). This is illustrated in Figure 4.7 with the associations and type of instruments in the data collection procedure for this study. This created an opportunity for the researcher to dig into the research problem utilizing two different approaches in harmony. Pragmatic epistemology, researchers trained in multiple methods frequently favor the equivalent status design, in which both qualitative and quantitative approaches contribute equally to the results (Kivunja & Kuyini, 2017). The results of data that has been analyzed on

phase one somehow inform the results of phase two, and neither approach is viewed as more important than the other (Dawadi *et.al*. (2021).

The research methods chosen are shown in Figure 4.5. This study followed a mix-method approach strategy, by using both qualitative and quantitative for the data collection process. This study used two instruments for data collection. An online Web-based survey (Annexure A) and semi-structured online interviews using were used to collect data (Annexure B). Therefore, this section discusses the research methods used in the data collection process.

4.10.5 Online Web Survey

Survey research gives an opportunity to reach numerous respondents in a relatively short time and can collect both qualitative and quantitative surveys (Anderson & Lightfoot, 2022). Research instruments are regarded as tools used to collect data. It is vital for the researcher to ensure that the tools utilized are dependable and valid and data collection procedures require to be fundamentally evaluated to allow expected results. Survey questionnaires are one of the instruments that manifest within the pragmatic worldview since they meet the ontological, epistemological, and methodological requirements as outlined on 4.5 of this study. According to Ogwu *et.al.* (2021), pragmatism allows researchers to focus on the factors that most impact their research topics and methods.

Ponto (2015:16) defines survey research as "the collection of information from a sample of individuals through their responses to questions". A web survey may be distributed in a variety of ways including via email, through social media such as Facebook, or a web intercept survey when visiting the website. The purpose is to predict the attitude and behaviour of a particular population when exploring a phenomenon in a specific field (Sammut, Griscti & Norman, 2021). Most Postgraduate during Covid 19 pandemic were forced to use web survey due to limitation of phase to phase for gathering data. Currently, web surveys have become vital tools for data collection methods where a set of questions is sent electronically to survey participants. The advantages of web surveys it that they reduce costs and time, especially in a larger sample that has a geographical distance and is environmentally friendly, it eliminates traditional paper-based surveys. Sammut *et.al* (2021) further states that there is also limitation to the web-survey such internet connectivity, threat to representation of the survey due to nonresponse bias.

The online web survey in the form of a questionnaire was a preferred method to collect data in the first phase of the study. The main reason that the researcher used this form of data collection is that the target population had access to the internet and portable devices such as laptops and smartphones. The use of portable devices and stable network connections is part of the requirement of LIS professionals in academic libraries in South Africa. The QuestionPro Survey software (an open-source, free software application) was used for the explanatory Web survey and could be accessed by using any Web browser. QuestionPro Survey software was used because it is approved software by the Durban University of Technology for researchers, and postgraduate students to collect and analyze their data and it is accessible through the university credentials. QuestionPro is a leading survey and research platform which is used to conduct customer satisfaction and other surveys. QuestionPro software has the following unique features including Raw data export and SPSS export. The other distinguishing unique feature is QR codes, which are specific barcodes (or two-dimensional codes) that can be stored via the survey's URL. Users who have a camera or smartphone with the appropriate reader application can scan the QR code to open the survey in their phone browser (QuestionPro Survey documentation, 2020). Figure 4.6 shows QuestionPro QR Code.

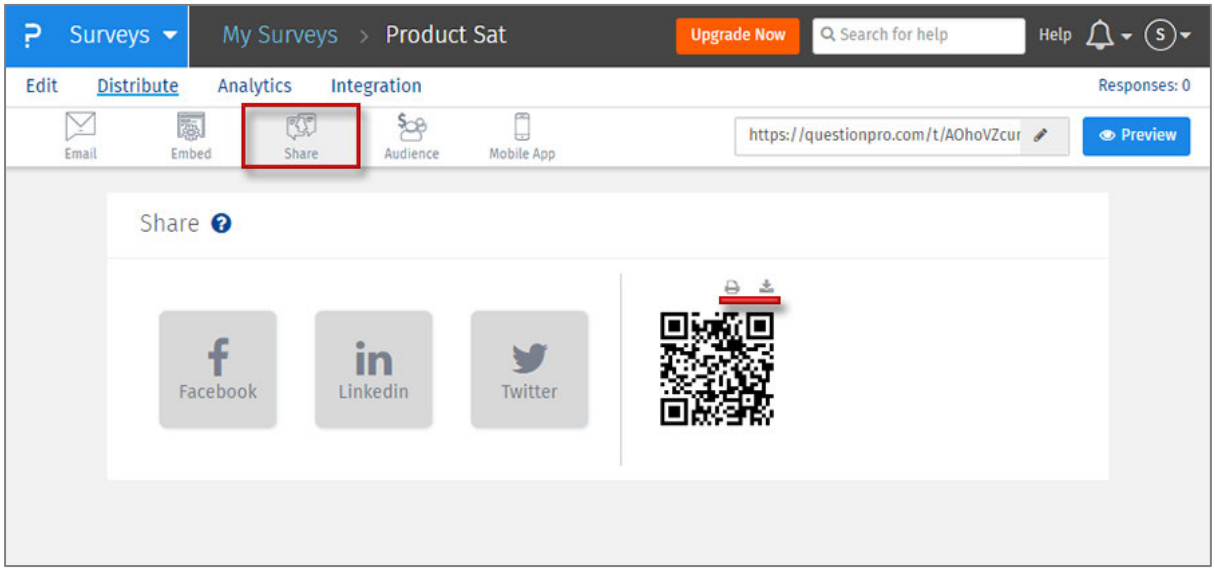

Figure 4.6 QuestionPro QR Code (QuestionPro Survey Software, 2023)

Furthermore, participants were given the option of clicking the survey link via email or QR code scanned via their mobile app to expedite the process and allow users to access the survey link at any time and from any location. After the deadline had passed, friendly reminders were

sent to participants via email to increase the response rate. The responses were saved in the software; tracking the number of responses was possible, and it is a feature embedded in the software. The user survey was simple to use, and question skips and filters when the response was negative proved to be a useful feature of the Web survey.

4.10.6 Structure of the Web Based Survey

An online web survey questionnaire follows the same characteristics as the paper survey version of the survey. However, the difference is that the data collection has different strategies that have specific characteristics (e.g., technological, demographic, response rate response, etc.). The online survey method is useful for collecting data from hard-to-reach populations such as lesbians, gay, bisexuals, and transgender (LGB&T) people or travelers and people with certain conditions such as HIV are often difficult to reach because they are stigmatized offline (Regmi *et.al*., 2016). Regmi *et.al*. (2016) further indicate that developing and operationalizing the online survey questionnaire has six methodological components which are critical to the online survey:

- User-friendly design and layout.
- Selecting survey participants.
- Avoiding multiple responses.
- Data management.
- Ethical clearance issues.
- Piloting tools.

Participation was based on information consent embedded in the survey using QuestionPro, the participants indicated by selecting “yes” or “no” and if no they will be automatically thrown out of the survey and prohibited from continuing with the study. Potential participants were briefed on the rationale of the study, the research approach, the research approach, the research approach, the research design, and sampling strategies. The data collection strategy and the study's contribution were explained. Potential participants will be briefed on the ethical consideration of the study. Potential participants provide a copy of the formal consent form and information letter (Annexure D) explaining the study's purpose, who conducted it, under whose

auspices, and its benefits. The principle of voluntary participation and the study's benefit includes the withdrawal from it. Participants were briefed on the confidentiality and anonymity of the study. The Structure of the web survey questionnaire to LIS professionals compromised six sections (refer to Annexure A).

The online web survey was pre-tested (discussed in Section 4.6.2). The aim of pilot testing is to confirm the clarity of the questions and related instructions, examine the period of replying to these questions by the participants, and obtain feedback from the respondent on validity, reliability, content clarity, and content specificity. The feedback obtained from pilot testing was used to improve and refine the questions, responses, and format of the questionnaire to enhance its effectiveness.

Section A This section requested demographic details of LIS professionals (Age, Gender and Education).

Section B This section requested organizational affiliation of LIS professionals.

Section C Respondents were required to provide information about what is the technological impact of next generations ILS in their libraries.

Section D This section focused on the skills and competencies of LIS professionals in the adoption of next generation ILS.

Section E This section focused on resources and the role of library consortium.

Section F This section focused on data privacy and security on next generation LIS.

Churchill and Iacobucci (2002) found that a researcher can choose the sample types of questions to be asked, questionnaires are primary tools for gathering primary information. Furthermore, for questionnaire development, Zefeiti and Mohamed (2015:5) take the nine-step approach of Churchill and Iacobucci (2002: 315), to develop research questions (Figure 4.7).

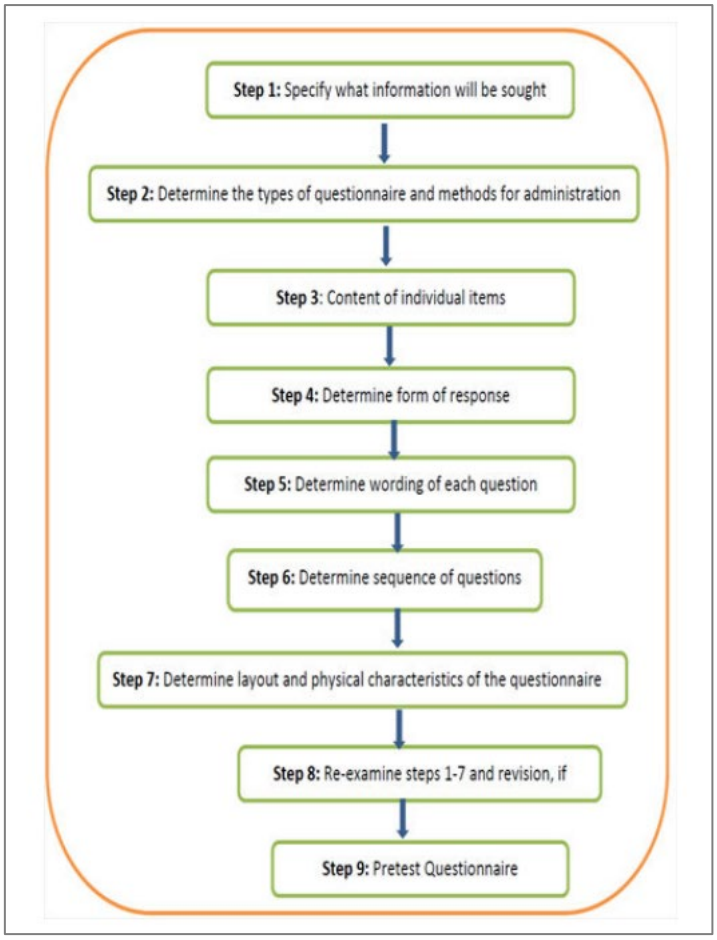

Figure 4.7: The procedural step of the current study (Churchill and Iacobucci, 2006: 315)

The procedural step of the current study is listed as follows:

- *Step 1.* Specify what information to be sought.
- *Step 2.* Determine the types of questionnaires and method administration.
- *Step 3.* Content of individual items.
- *Step 4.* Determine form of response.
- *Step 5.* Determine wording of each question.
- *Step 6.* Determine sequence of questions.
- *Step 7.* Determine layout and physical characteristics of the questionnaires.
- *Step 8.* Re-examine steps 1-7.
- *Step 9.* Pre-test Questionnaires.

Respondents were required to answer a variety of closed and open-ended questions. For closed and multiple-choice questions, respondents selected radio buttons. There were spaces for LIS professionals to answer open-ended questions, and respondents completed the questionnaires by clicking the "submit" button on their laptops, devices, or mobile phones.

4.10.7 Interviews

The online presence of the researcher and participant(s) frames the interaction and sharing of experiences in synchronous interviews. According to Busher (2012:179), online interviewing made possible by communication platforms such as Instant Manager, an electronic communication system that combines the features of telephone-synchronous conversation and email, can result in rapid, real-time chat. Immersive multi-user environments enable participants to share visual artifacts, images, or environments, whether real or imagined (Salmons, 2010).

For qualitative data collection, interviews were conducted using semi-structured questionnaires with twelve LIS Directors. Interviews were approached by virtual/online video conferencing platforms MS Teams (Microsoft Teams). MS Teams is a proprietary business communication platform created by Microsoft 365 family products that are replacing other Micro-operated business messaging and collaboration platforms such as Skype, Zoom, and Microsoft Classroom. Each willing participant was interviewed one-on-one online. (Microsoft teams documents, 2022). The interviews lasted between 30-45 minutes.

Vasileiou *et.al.* (2018) states that studies employing individual interviews conduct not more than 50 interviews so that researchers are able to manage the complexity of the analytic task. This data collection adopted the pragmatic of this study. It allowed the researchers to probe the answers provided and allowed participants to explain and build their own answers. This added richness of collected data, typically the interviews were recorded, and notes taken during the interview. The rationale of the study, the research approach, the research design, and the sampling strategies were explained to the participants. Details were provided on the data collection strategies and the study contribution. The interviews were conducted over a period of ten (10) months because of the delay caused by load shedding including accommodating directors in their busy schedules, either on leave, attending workshops, conferences, etc. A predetermined list of questionnaires was compiled and used as a guideline for each interview. The online interviews were recorded and transcribed using Otter.ai, a software artificial

intelligence to empower users with real-time transcription meeting notes shareable, searchable, accessible, and secure (Otter.ai documents, 2022). Each LIS Director

4.10.8 Pretesting instruments and pilot Study

The aim of pilot testing is to confirm the clarity of the questions and related instructions, examine the period of replying to these questions by the participants, and to obtain feedback from the respondent, on validity, reliability, content clarity, and content specific (Wadood *et.al*., 2021). A pilot study can be considered a feasibility study, as it can be used to determine whether the full study can be completed. The feedback obtained from pilot testing was used to improve and refine the questions, responses, and format of the questionnaire to enhance its effectiveness. Bhalla, Bahar and Kannapathy (2023:13) state that "pilot testing, pre-testing or instrument pretesting in specific ensures that a study achieves a greater of construct validity instrument trustworthiness and reliability. Figure 4-8 depicts pre-testing and where it sits in the typology of pilot studies and the key issues it addresses.

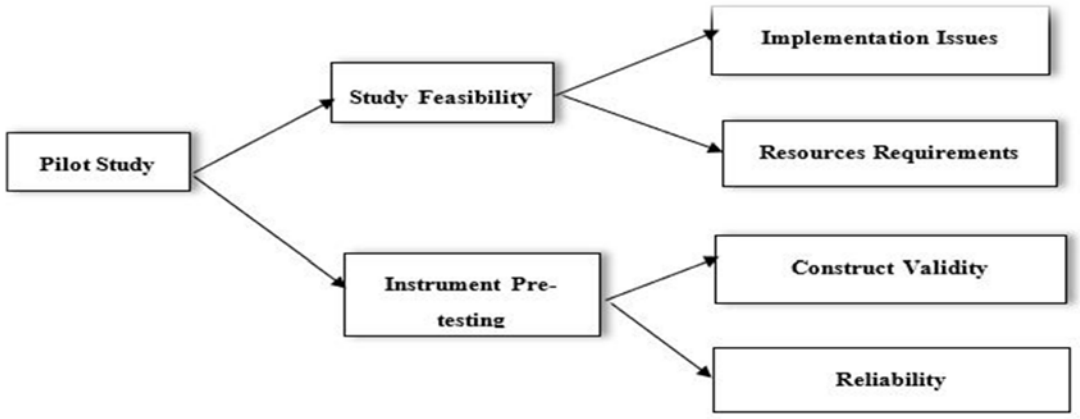

Figure 4-8 Pilot Study Topology and Issues Address (Bhalla et.al. (2023:13)

According to Wadood *et.al*. (2021) a pilot study entails distributing a questionnaire to a sample of respondents who are representative of the target research sample and then using statistical analysis and feedback to reduce the number of questionnaires to a manageable number. In this study, the researcher pretested the questionnaire using a sample of six LIS professionals from Cape Peninsula University of Technology from different departments of the library which included: Technical Services, IT, User Services, Faculty, and Academic Support Services. The email was sent to ten participants and only six participants consented to the study. A web-based software QuestionPro was used to design and distribute questionnaires and send them via email with the link to the study, Participants willing to use their mobile app used a created QR code to scan the link of the survey.

Respondents agreed on the questions, and the instructions of the web questionnaires were valid, reliable clear, and unambiguous. Respondents felt that there were no omissions to questions. They mentioned that the questions were not offensive, confusing, or sensitive. There were no issues reported on language and grammar. However, there were several minor changes identified by respondents on the web questionnaires. These changes included Question 12 (Q12), the change to the acronym next-generation ILMS (Integrated Library Management Systems) to the preferred next generation ILS to be consistent in the study. The other change was on Question 23 (Q23) the new name changes of the library consortia CALICO (Cape Library Co-operative) to CHELiN (Cape Higher Education Library Network). CHELiN is a project of the Cape Higher Education Consortium (CHEC) and consists of the four higher education libraries in the Western Cape. Some clarification for certain concepts is used in open-ended items. This was corrected and the questionnaires were finalized for administration to all LIS professionals. The pretest was conducted for two weeks during October/November 2021. The allocated time for the survey was 45 minutes, and the highest time completed on the online survey was 44 minutes, there was no need to change the time allocated to respondents to answer the online survey questionnaires. All the questions were completed on different dates and returned. All participants answered using a desktop/laptop/mobile device for the web survey. To make the survey easier a link survey was created using a QR code to allow the user to have a direct link to the survey via their mobile devices to allow easy access during the country's Lockdown Level 2 and to observe and adhere to Covid-19 restrictions and protocols.

Table 4.3 reflects the distribution and response of pretesting of the web questionnaire.

Desktop/Mobile/Laptop Device				
Respondent	**Number of questionnaires distributed**	**Number of questionnaires returned**	**Time taken to complete questionnaire's**	**Date Completed**
Participant 1	1	1	42 Minutes	25/10/2021
Participant 2	1	1	43 Minutes	25/10/2021
Participant 3	1	1	22 Minutes	26/10/2021
Participant 4	1	1	9 minutes	2/11/2021
Participant 5	1	1	44 minutes	3/11/2021
Participant 6	1	1	12 minutes	8/11/2021

Table 4-3 The distribution and response rate for pre-testing the web survey questionnaire.

The semi-structured interview schedules for online interviews with LIS Directors selected from 26 Public Universities in South Africa were piloted. An information letter explaining key concepts in the study was prepared for the LIS Directors (Annexure D). Pilot three included (3) Library Directors selected from 26 Public Universities in South Africa to request the pre-test on the online interviews. The academic libraries selected were the Central University of Technology (CUT), the University of Witwatersrand (WITS), and the University of Venda (UNIVEN). The Directors agreed on the online interviews and Microsoft Teams was used to distribute the interview questionnaires attached to the invitation. The respondents agreed for the interview to be recorded on MS Teams, in addition, Otter.ai, a software that uses artificial intelligence was used for transcription.

Respondents agreed on the questions, and instructions of the interview guideline sent prior to their interviews were dependable, clear, and unambiguous. Respondents felt that there were no omissions to questions. They mentioned that the questions were not offensive, confusing, or sensitive. There were no issues reported on language and grammar. There were no changes identified by respondents on the online interview questionnaires. Participants were given one week to prepare for the interviews and were given the option to select their own dates and times for interviews to accommodate their busy schedule as executive management. The allocated time for the survey was 45 minutes, and the highest time completed the online interviews was 40 minutes, there was no need to change the time allocated to respondents to answer the online survey questionnaires. All the questions were completed on different dates and returned. All

participants answered using a laptop on online MS Teams. Interviews were conducted online on the country's Lockdown Level 2 to observe and adhere to Covid-19 restrictions and protocols.

4.10.9 Procedures followed in administering of instruments and data collection

This section discusses how the online web-based questionnaire, and semi-structured interviews were facilitated by the researcher.

The study was registered with the Durban University of Technology, Faculty of Accounting and Informatics. The research proposal went through the Faculty Research Committee, a division of the Faculty of Accounting and Informatics. The Faculty Research Committee approved, registered and ethically cleared the proposal before the researcher could continue with the study. (refer to Annexure D). The researcher was advised by the supervisor to contact 26 Public universities in South Africa for permission to conduct research in these institutions. The process of approval in the form of the gatekeeper's permission can be challenging as these research committees meet at different times during the academic year. The researcher assumes that the unavailability of senior committee members was due to meetings, leaving or attending conferences or workshops. The other challenges that the researcher assumed were reasons such as Covid 19 pandemic, lockdown and student protest can delay the process in these universities.

Once the researcher started getting the gate keepers letters (refer to Annexure D), the LIS directors were contacted, seeking permission to conduct research. The LIS professionals list was obtained from their Library Websites or directly from the library administration or human capital department. Some websites did not provide contact details for LIS professionals which meant that the researcher had to contact library departments at the institutions telephonically or via email. The researcher compiled a database of the Public Universities with their contact details obtained via their institutional websites including the LIS Director's list obtained via CHELSA , and LIASA Website. Directors had to be contacted via their secretary and personal assistant, and it was a difficult process to locate or get permission to schedule interviews because of operational reasons, most of them were either newly appointed or acting in the positions and waiting for new appointments.

The population of the first phase of the study was 91 LIS professionals from academic libraries in public universities in South Africa. The instrument use was an online web-based survey in a questionnaire. A total of seven- group listed emails was initially sent to LIS professionals in academic libraries at public universities in South Africa. The email compromised an introduction to the research, purpose of the study and live link to the online survey and an option QR code to scan and access the online survey. The emails also included the consent letter forms, gate keepers' permission letters for their institutions, and permission from DUT to conduct their research (refer to Annexure D, E &F). The online questionnaire was administered to 91 LIS professionals through QuestionPro software 1st October 2021 – 27th July 2022 and 91 (52.91%) LIS professionals participated in the study. Figure 4-6 illustrates QuestionPro Survey responses.

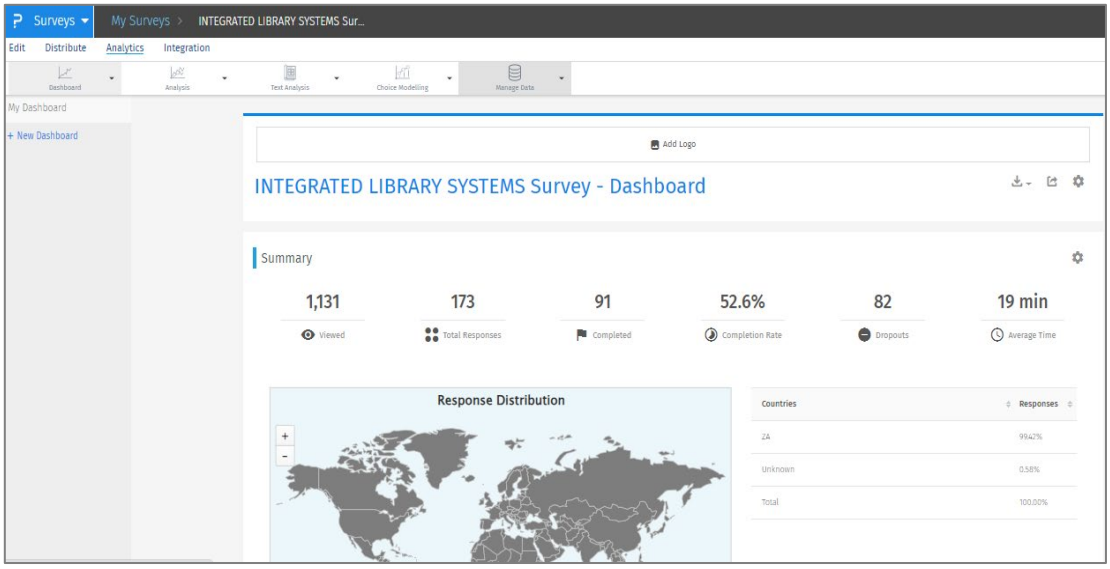

Figure 4.9 QuestionPro Survey Responses (QuestionPro Survey Software, 2023)

The results from the online questionnaire were downloaded into SPSS (Statistical Package of the Social Sciences) Version 29.0.0.0 (241) and exported to an Excel spreadsheet. The result of the quantitative phase with the help of the statistician. The statistician provided descriptive analysis, inferences, and regression model for the quantitative phase of the study. The results of the online web-based survey decisively positioned the study as the results and analysis provided a path to the researcher for the second phase of qualitative in terms of the forms of questions to ask the participants for the semi-structured interviews.

The researcher contacted the research offices of public universities via email. Each university had different requirements, but common to all was the permission from DUT for the researcher to conduct the research (Annexure E), a sample consent form for participants (refer to Annexure F).

The second phase of the study included semi-structured online interviews with LIS directors from academic libraries in public universities in South Africa. The online interviews were conducted during the Covid 19 Pandemic period on Microsoft Teams (MS Teams) as all the LIS directors were using the virtual platforms. Once an appropriate date and time was agreed upon, invitations were sent via electronic email to participants. This electronic email was an invitation to MS Teams platform that, once the participants accepted automatically saved on MS calendars (MS Teams and MS Outlook). The emails also included the consent letter forms, gate keepers' permission letters for their institutions, and permission from DUT to conduct their research (refer to Annexure D, E &F). Participants were given one week to prepare for the interviews and were given the option to select their own dates and times for interviews. Before each online interview started, participants were taken again through confidentiality, and the researcher requested permission to record it. The researcher also assured each participant that the recording will be secured with anonymity and not made public to anyone.

Transcription and recordings were done via Otter.ai. Participants were requested to sign a consent form and return it via email (Annexure F). The online interviews were recorded and transcribed using Otter.ai software (Section 4.6.1). The transcriptions were transferred into MS Word and the raw data was exported to an Excel spreadsheet ready for analysis. The data was analyzed using Microsoft Excel 365, there was no need to use qualitative software as the sample was very small. The interviews were conducted between 8 November 2021 to 5 August 2022. A list of online interviews with LIS Directors is shown in Table 4-4.

LIS Director	Date	Interview Duration (Minutes)	Institution
1	2021/11/18	40	Central University of Technology
2	2021/11/25	39	Wits University
3	2021/12/02	23	Durban University of Technology
4	2021/12/06	25	University of Venda
5	2022/02/11	48	University of Northwest
6	2022/04/04	48	Nelson Mandela University
7	2022/05/13	35	University of South Africa
8	2022/05/24	22	University of South Africa
9	2022/06/08	20	University of South Africa
10	2022/08/02	39	University of Kwa-Zulu Natal
11	2022/08/03	29	University of the Western Cape
12	2022/08/05	47	University of Limpopo

Table 4-4 List of online interviews with LIS Directors Source: Author, 2022

4.11 Validity and reliability of the study

Reliability refers to the consistency of the measure is an indicator of the stability of the measured values obtained in repeated measurements under the same conditions using the same measuring instrument (Surucu & Maslakci, 2020:2). According to Tabri *et. al*. (2020: 284-285) content validity is defined as "the degree to which an instrument reflects the content universe to which the instrument will be generalized". To improve validity of this study the researcher used multiple data collection instruments, namely Web survey and semi-structured online interviews, discussions were all pre-tested and piloted. The validity of quantitative data is found to be dependent on the structure of the questionnaires and how accurately they are related to the research area.

The Cronbach alpha coefficient is the most used instrument in reliability testing of the study. The Cronbach alpha was used to measure the internal consistency of internal consistency of the data in the Web Survey. The coefficient was calculated using SPSS Version 29.0.0.0 (241). The Cronbach Alpha coefficients were evaluated from highest to lowest. The approach is as follows - greater than 0.90 indicating excellent; greater than 0.80 but less or equals to 0.90 indicating good; greater than 0.70 but less or equals to 0.80 indicating acceptable; greater than 0.60 but less or equals to 0.70 indicating questionable; greater than 0.50 but less or equals to

0.60 indicating poor; anything less than 0.50 indicating unacceptable (Amirrudin *et.al*, 2021: 224; Taber, 2017:1277). Table 4.5 shows the coefficient of alpha selected to assess the instrument's reliability

.Cronbach's Alpha	Internal Consistency
< 0.9	Excellent
0.8 to < 0.9	Good
0.7 > 0.8	Acceptable
0.6 > 0.7	Questionable
< 0.6	Poor
>0.6	Unacceptable

Table 4-5 Selection of Coefficient to Observe the Extent of Reliability Instrument (Sharma, 2016:273)

The coefficient presented the overall average of 0.936 indicates that this category of research has a strong association in terms of consistent scoring. This is discussed in the next chapter (refer.to Chapter 5). Nawi *et al.* (2020) state that "measuring the validity and reliability is a matter of degree because it determines how all factors and which factors should remain, be revised, or be removed from the instrument". Furthermore, Sharma (2016), confirmed that a maximum alpha value of 0.90 is recommended.

The pilot project also provided valuable feedback from participants, thus removing ambiguity, language, grammar, duplication of questions and biasness, making the instruments valid and reliable. Detailed literature review will be achieved through adopting previous, well tested and utilized in a wide spectrum of studies questionnaires for quantitative method. Although the test measures used to establish the validity and reliability of quantitative research cannot be applied to qualitative research, there are ongoing debates about whether terms such as validity and generalizability are appropriate for evaluating qualitative research; alternative criteria for demonstrating rigor in qualitative research, namely truth value, consistency, neutrality, and applicability, can be used to evaluate qualitative research (Noble & Smith, 2015:2).

In this study, the instruments used in the semi-structured online interviews were pretested and piloted to eliminate bias. The web-based questionnaire was concise. Participants were given the option of clicking the survey link via email or QR code scanned via their mobile app to

expedite the process and allow users to access the survey link at any time and from any location. This made it seamless for participants to navigate and select options to complete the survey in less than 19 minutes. In terms of the semi-structured interviews, the researcher was conscious of the time limit and kept the data collection procedure between 30 to 50 minutes, the length of interviews was originally scheduled for 60 minutes. At every stage of the study's data collection procedure, the researcher tried to maintain reliability and validity. Therefore, it is important that the researcher ensure reliability and validity in the data collection procedures, to address how the data was collected and presented. The next section focuses on the data analysis presentation of the study.

4.12 Reliability statistics

According to Singh (2017: 797), Cronbach Alpha is defined as "a computer program that correlates the scores for each scale item with the total score for each observation (typically individual survey respondents) and compares the variance for individual item score". Cronbach alpha was used in this study to assess the internal consistency of the Web survey response scale (Annexure A of the Web survey questionnaire). Taherdoost (2016) state that testing for reliability is important as it refers to “the consistency across the parts of the measuring instrument,” the most used instrument is Cronbach Alpha coefficient.

The Cronbach Alpha reliability testing is used to evaluate the internal consistency. It is considered as a measurement of scale reliability. For this research, reliability (as discussed in section 5.2). According to Nawi et al. (2020:), measuring the validity and reliability is a matter of degree because it determines how all factors and which factors should remain, be revised, or be removed from the instrument.

4.13 Data analysis

Substantial amounts of data are reduced through the process of "data analysis," which includes three steps: data organization, data reduction through summarization and categorization, and pattern and theme identification and linking (Ali, 2021) In this study, a mixed approach was used and both qualitative and quantitative techniques was used for data analysis.

Qualitative data analysis is usually based on interpretive philosophy, and diverse methods are available that incorporate different ontological and epistemological perspectives, a design which tests theory against empirical data requires pre-set codes, grounded theory researchers insist upon, and other with deeply held philosophical commitment of qualitative research are likely to prefer, emergent codes (Elliot, 2018). It allowed the researcher to understand and conclude a phenomenon (a sample) that is studied and identified. During the first phase of this study, descriptive and inferential statistics were used to examine the different elements of the data that addressed the research questions, as well as the relationship between the different concepts with reference to the next-generation integrated ILS that was used in the study. According to Ali (2021:3), there are three types of data analysis discussed:

- *Descriptive*. A type of quantitative data analysis that is used to describe or present data in a quantitative format that is easily accessible.
- *Distribution of frequencies*. The researchers logically arrange each measurement from high to low, the frequency distribution of data aids in calculation for statistical analysis.
- *Graph administration*. A data diagram that shows a relationship between or two or more quantities, measurement of an indicative number.

The data from the numerous data collection sources were then integrated into the discussion of the finding for the purpose of describing meanings and patterns in the data and explaining how the study finding relates to the phenomenon of next-generation integrated library systems. The data analysis process begins by breaking down large amounts of data into smaller, more manageable components. Missing or incorrectly encoded data is identified (Leedy & Ormond, 2019). The researcher began the data reduction process by checking responses as part of the study's initial quantitative phase. The Web was administered to 173 LIS professionals of which only 99 (52.91%) participated. Eighty-one respondents dropped out of the study and were omitted because of missing or incorrectly encoded data. Descriptive statistics were used in this study to calculate the mean, frequency, and standard deviation. The researcher was able to draw conclusions about the population using inferential data analysis. The quantitative phase of the study findings from the Web Survey. The data collected from the responses were analyzed using SPSS version 28 and Microsoft Excel 365 version. The results were presented using

graphs, cross-tubulation, and other figures. Tables with frequency-tabulated labels, values, and frequencies were created.

For the qualitative phase, data analysis in this study followed a framework approach. The framework approach provides clear steps to follow and produces highly structured output; therefore, it is useful for managing large data sets were obtaining a holistic, descriptive overview of the entire data is desirable (Gale *et.al*, 2013:2). Gale *et al*. (2013) further state that this approach contrasts with entirely inductive approaches, such as grounded theory, where the research is an iterative process and develops in response to the data obtained an ongoing analysis. The Framework Method is most used for the thematic analysis of semi-structured interview transcripts. By using a framework approach, the researcher was able to go back and forth between the data until a cogent account is revealed. Each recording and its accompanying field notes were filed on the cloud using Otter.ai software and archived for potential retrieval in case of data theft or loss.

The transcription of data assisted the researcher with interpretation and building insights. The next step in the data analysis process was to get to know the data by reading transcription and listening to video recordings if needed. Coding of transcribed data and field notes was done through meaningful units, the coding process generates categories that must be fleshed out by seeking relevant data bits that inform the category (Elliot, 2018). Codes allocated will be developed during the coding process, which is inductive coding. In the analysis of transcripts and fieldnotes, an inductive, grounded theory approach was used, allowing the emergence of categories and themes from data and the development of theory. Microsoft Excel 365 software was used to analyze the qualitative data from the semi-structured interviews with LIS (Library and Information Services) Directors. Microsoft Interviews Excel 365 software was appropriate for this study, as the sample used was very small. The interviews were conducted with twelve LIS Directors out of 26 public universities in South Africa via Microsoft Teams.

Since the study used sequential explanatory strategy Taherdoost (2022), the data from the Web survey conducted for LIS professionals was analysed first, where the closed questions were analyzed using SPSS Version 29.0.0.0 (241) while open ended items (qualitative data) from the interviews were grouped into themes and presented in tables with frequencies and percentages and in narration of themes. The results were then used to plan the qualitative follow

up interviews with LIS directors exposed to management of the next generation integrated ILS. The researcher spent a lot of time in the interpretation of both qualitative and quantitative qualitative data compared to theories (refer to Chapter 2), literature review (refer to Chapter 3), findings (refer to Chapter 5), and the discussion section (refer to Chapter 6).

4.14 Time horizon

There are two types of research based on the time horizon: longitudinal and cross-sectional. Cross-sectional research studies samples at a specific time; longitudinal research studies samples over a period; the period in longitudinal research can range from short to long term (Melnikovas). This study used cross-sectional time aspect, since the study aimed at acquiring and understanding of present time and precedent occurrences (Saunders *et al*., 2019). The aim of the cross-sectional analysis is to examine certain characteristics or phenomena at a specific time. This was thought to be appropriate because the available time for the study program was limited, and thus the survey strategy had little time available (Melnikovas, 2018)

4.15 Ethical issues

In the literature, ethical issues arose in discussions about codes of professional conduct for researchers (Ajuwon, 2020). There are ethical principles the researchers must follow in the research. Therefore, issues such as anonymity of participants, confidentiality of data collected, and information of concern were adhered to in this research (Drolet *et.al*, 2022). Assurance was given to participants that participation in the study will be voluntary.

In terms of this study, the researcher adhered to the protocols, principles and checklist as discussed. Before the beginning of the study, the researcher received obtained ethics approval to conduct this study (Annexure F) from Durban University of Technology, where this study is registered. Thereafter the researcher requested official permission to conduct research from 26 Public Universities in South Africa (Annexure D). This was done through the research offices (ethics) at the Public Universities via email. Identifying the official channels for obtaining funding to conduct research was a difficult and complex process because the requirements for seeking positions varied and were time-consuming for the researcher. Time delays occurred when institutions were unclear about the ethics process in their institutions, where research committees met quarterly, and when documents submitted by researchers were

not forwarded to the appropriate ethics departments or did not reach the ethics committee on time.

Ultimately, permission from eighteen universities was obtained via electronic email (Annexure D). One academic library withdrew from the study at the last minute for operational reasons and stated that they receive many requests by researchers to conduct research for the current academic year in their university. This resulted in the study conducted in seventeen universities. Nine universities were excluded in the study. The primary reason for non-resistance for some institutions was the increased amount of research conducted in their institutions, with a corresponding increase in the challenges faced by Research Ethics Committees (REC). To enhance the overall quality of research activities and guarantee that current REC members follow international standards, Omari *et al*. (2021) discovered that decision-makers need to reevaluate the current structure of RECs as well as the difficulties faced by members. The time delays involved in obtaining an ethical review and the competencies of research ethical committees regarding the study's technical and ethical aspects are among the pragmatic objections.

The researcher forwarded the ethical clearance letter and gatekeeper's permission letters to the library directors (Annexure D and F). The support from the heads of the libraries was either provided directly or through their secretaries. The researcher was provided with the email addresses of academic librarians who were involved in the online teaching of library instruction at the Public Universities. The researcher contacted the LIS professionals and library directors via email with the necessary ethics documentation. Most participants in the study voluntarily signed a letter of informed consent (refer to Annexure C). The confidentiality and privacy of all participants were always maintained. The researcher did not make any direct reference to the participants' personal details or the Public Universities. Furthermore, the purpose of the research was clearly outlined in the cover letter (Annexure C). As mentioned in the ethics checklist, no participant was forced to respond to the survey or participate in the online semi-structured interviews. The researcher also outlined in the cover letter of the web-based questionnaire that confidentiality would be guaranteed. Participants would remain anonymous as the QuestionPro online survey software would automatically capture responses. The consent for conducting online interviews and using Otter ai for interpretation was communicated to LIS directors. The only individuals that would have access to the captured data would be the researcher and supervisors.

The research participants were treated with care, respect, dignity, fairness, and politeness. At no stage was any harm allowed to befall the participants. The researcher agreed to follow all ethical principles applicable to the research by obtaining voluntary informed consent from all participants and maintaining individual confidentiality. The next section presents an evaluation and reflection of the research methodology of this study.

4.16 Evaluation of research methodology

The research methods selected are influenced by whether the objective is to specify the kind of information to be gathered in advance of the study or to allow it to emerge from project participants. The best research method for the study is determined by several factors, including the research questions, objectives, and topic (as discussed in Section 4.4.2 in detail). This study followed mix method research by employing an explanatory model, which contains first quantitative data collection, followed by qualitative data collection (see Section 4.4.2). This method was used to obtain a clear picture of the quantitative data, and then use qualitative data to provide a better understanding and explanation of the study in question. For this study, a pragmatic approach was chosen as the epistemological lens of this study (as discussed in Section 4.4.3).

The study mix method design can be classified as explanatory sequential methods research, which contains first quantitative data collection, followed by qualitative data collection in exploring the nature and extent of the adoption and maintenance of the next-generation ILS in academic libraries. The researcher thoroughly followed the procedures for administering instruments and collecting data. The research realities were jointly constructed ontologically by the research parties and conducted in natural ontology in qualitative research (discussed in Section 4.4.3). According to Taherdoost (2022), the explanatory sequential method is distinguished by the collection and analysis of quantitative data in the first phase of research, followed by the collection and analysis of qualitative data in the second phase, which builds on the findings of the first phase. Therefore, based on research questions and the researcher's objectives for this study, utilizing mix-method design is the most appropriate because it is believed that it allows researchers to be more confident of their results (Dawadi *et.al*,2021). Using a mixed method in this study allowed the researcher to obtain an extensive overview of

the current state of next-generation ILS in academic libraries in South African higher education institutions.

According Ngulube and Mosha (2023) a theoretical framework is made up of a selected theory (or theories) that underpins your thinking in terms of understanding and planning your research topic, as well as concepts and definitions from that theory that are relevant to the topic." This study is supported by the theoretical framework (presented in Chapter 2). All academic libraries in higher education institutions that use/manage integrated library systems as their Library Management system to manage print and electronic resources are included (note that there was no response from eight institutions with large staff compliments). To increase the rigor of the study and to try to increase reliability, the instrument was pre-tested (refer to Section 4.6.2 of this chapter 4). The pre-test and pilot study feedback resulted in a more accurate and comprehensive instrument. In this study, both probability (cluster sampling, and simple random sampling) was used, the population is spread in a wide geographic area, and the method of collecting data and analysis will be both quantitative and qualitative approaches (discussed in Section 4.5.2 and 4.5.3). Seventeen of twenty-six public universities participated in the study, geographically located in nine provinces in South Africa.

This study employed inductive reasoning (Section 4.3). This is primarily because there will be no testing of any concepts, instead, the focus will be on developing a model for the adoption and maintenance of the next generation ILS in academic libraries. Inductive research begins with observations or data collection, then moves on to a broad view of data and search patterns and finally draws conclusions that may be incorporated into theories. A survey research strategy will be used in this study. This type of research allows for a variety of methods to recruit participants, collect data, and use various methods of instrumentation; it can be used for quantitative research strategies (Section 4.3.1). As a result, the researcher is confident in the validity of the results, which are based on logically designed sample designs and a data collection plan.

The researcher is confident that the design, approach, and methods that were employed in this study were appropriate for responding to the research questions that were generated to address the objectives of this study. The overall methodology allowed the researcher to ascertain and

understand the adoption barriers of next-generation ILS by LIS for a better understanding of the use of this phenomenon in academic libraries in South African higher education institutions.

4.17 Summary

The chapter offered and overview of the research methodology and design, which were adopted for this study, it highlighted philosophical theory of the research, which played a vital role in deciding the selection of research methods, techniques, paradigm, and approaches implemented in the study. The study embraced survey strategy, pragmatic and interpretivist, exploratory research, and the implementation of quantitative and qualitative method during data collection and analysis. Explanatory sequential method was followed by the collection and analysis of quantitative data in the first phase of research, followed by the collection and analysis of qualitative data in the second phase, which builds on the findings of the first phase. The research instruments used were used for the open ended and closed questions.

The research instruments used were used for the open ended and closed questions. This study employed an inductive approach. Inductive research begins with observations or data collection, then moves on to a broad view of data and search patterns and finally draws conclusions that may be incorporated into theories. The research instruments for both quantitative and qualitative data used both open-ended and closed questionnaires. For quantitative purposes, the questionnaires collected using an online Web survey (QuestionPro) amounted to 172. They were collected from seventeen out twenty-six academic libraries in the higher education institutions in South Africa, resulting in 91 completed questionnaires that were used for the research. The population, including LIS professionals, managing the next generation ILS for managing their print and electronic resources. For quantitative purpose semi-structured interviews were conducted with 12 LIS directors from seventeen academic libraries.

CHAPTER FIVE
PRESENTATIONS OF RESEARCH FINDINGS AND ANALYSIS OF RESULTS

5.1 Introduction

Chapter Four focused on the research design, paradigms, approaches, methods and data collection procedures that were employed in this study. This provided the researcher with the context to make decisions suitable in framing the methodology of the study. Additionally, the aim, objectives, and critical questions of this study were fundamental in determining the type of MMR design. The researcher selected the explanatory sequential design after exploring the literature for MMR. The explanatory sequential design is a two-phased project (section 4.9.2). This researcher used quantitative data for the first phase and qualitative for the second phase. The MMR chosen was underpinned using pragmatism (Figure 4.5). This paradigm allowed the researcher to equally combine objectivity and subjectivity using different research approaches. Pragmatism also creates a platform for the researcher to use The MMR in this study is *'explanatory sequential mixed method'* as a result, in the mixed method design of this study, both empirical and phenomenological approaches carry equal weight (Figure 4.4). The findings chapter of this study aims to illustrate this from the data analysed using the web-survey and semi-structured interviews.

The sequence of explanatory mix method design is governed by the quantitative phase being the first phase of the data collection process. The researcher collected data by using the Cronbach Alpha reliability testing used to evaluate the internal consistency through the web-survey questionnaire. The study's reliability was assessed using Cronbach's Alpha technique, with a value greater than 0.60 indicating an acceptable statistical testing level (Taber, 2017; Amirrudin et.al, 2021). The aim of the study was to explore the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries.

The web-based survey was administered to 173 LIS professionals at Public Universities in South Africa, 91 (52%) responded. The result of the web-survey through descriptive, inferential, correlations, and regression statistical methods. This informed the researcher about which sampling method would be relevant for the second qualitative phase. The researcher

chose cluster sampling. The population was spread in a wide geographic area, and the method of collecting data and analysis was both quantitative and qualitative approach. Subsequently, a random sample was taken from clusters, all which are used in the final sample in the form of semi-structured interviews. The researcher randomly selected LIS directors with knowledge of managing library management systems because they were prepared to share life experience on the phenomenon. The results analysis on the web-based survey also provided the researcher with the type of interview structure suitable for this study, and the type of questions to ask participants. The researcher had to consider what data analysis tools to use. For the Web survey, the researcher collected the data using a questionnaire using QuestionPro survey software. Missing or incorrectly encoded data was identified. The data was imported from the QuestionPro survey, and the questionnaire were transferred into MS Excel, where raw data was exported to an Excel spreadsheet ready for analysis, and data errors were cleaned and exported to the SPSS Version 29.0.0.0 (241) software. The online interview was conducted using Microsoft Team to secure the online meeting on MS Teams. Transcription and recordings were done via Otter.ai. Transcriptions were transferred from MS Word to Excel spreadsheet for analysis.

This chapter starts with the order of priority by presenting the precision of the data instruments used for this study. The coefficient was calculated using SPSS Version 29.0.0.0 (241). The proposed research's instrumentation was derived from previous reliable studies. Furthermore, this section was used as multiple measurement. This preceded by descriptive statistical results, including correlations that may exist between items with the constructs in the web-based questionnaire. The results were presented using graphs, cross-tubulation, and other figures. Tables with frequency-tabulated labels, values, and frequencies were created. For the qualitative phase, data analysis in this study followed a framework approach. The results followed results from thematic and framework approach of the semi-structured interviews through a process of coding, resulting in emergence of themes. By using a framework approach, the researcher was able to go back and forth between the data until a cogent account is revealed. The thematic patterns that occurred in the second qualitative phase and correlations form the quantitative phase are equally mixed to ascertain the extend of the adoption and maintenance of next generation ILS at Public Universities in South Africa. Lastly, the theoretical frameworks and literature reviewed are triangulated equally with the findings from both phases to present an analysis of the research problems.

5.2 Reliability and validity findings

Taber (2017:1275) states that measuring reliability and internal consistency is the most important step in the data analysis process. The accurateness of instruments is established through reliability and validity. Reliability refers to the consistency of the measure is an indicator of the stability of the measured values obtained in repeated measurements under the same conditions using the same measuring instrument (Surucu & Maslakci, 2020:2). According to Tabri *et. al*. (2020: 284-285) content validity is defined as "the degree to which an instrument reflects the content universe to which the instrument will be generalized". The researcher validated this study by using more than one instrument in the data collection process (refer to section 4.11). According to Nawi (2022), by using this procedure, items with high correlation values with the test index score have high reliability, whereas items with lower correlation values have lower reliability and will be discarded from the test.

Cronbach's alpha coefficient was to determine the internal consistency of and correlations that exist in measuring the reliability instrument. According to Sharma (2016).There are various reports on the acceptable value of alpha, which ranges from 0.60 to 0.95. The construct that was measured in the Web survey was the section C on *the technological impact on the next generation ILS in academic libraries* and Section F on *data privacy and security* (Annexure A) administered for LIS professionals. The extent to which a group of items measures the same construct, as evidenced by how well they vary together, or intercorrelate," is referred to as inter-item correlation (Amirrudin *et.al*, (2021:225). These sections were used because they contained multiple-point scales. The use of. This allowed the researcher to probe underlying constructs and the reliability of sub-scales. Sharma (2016:273) indicate that a maximum alpha value of 0.90 is recommended and any value closer to number one is good. The overall average of these constructs is presented in Table 5-1.

Constructs	Cronbach's Alpha	Number of items
Technological Factors	0.822	3
User Training Factors	0.633	3
Trust Factors (Data and security	0.936	6
Overage average	**0.879**	**12**

Table 5-1 Reliability of measuring instruments (Cronbach's alpha coefficient)

Table 5-1 indicates that the web-survey instrument (12 items) used for the study is reliable and evidently has a good inter-item consistency (a = 0.879). The technological, user training and trust factors constructs for adoption and maintenance of next generation ILS have a high degree of internal consistency and reliability when measured. Subsequently, trust factors have a high level of inter-item consistency (a = 0.936), followed by user technological factors (a = 0.822), and user training factors (0.633). Additionally, the item reliability for the web-survey ranges from 0.633 – 0.936 as separate constructs. Therefore, items measuring technological, user training and trust factors indicate a high degree of inter-item consistency and reliability (a = 0.879). As a result, the research instruments should be accepted and adopted for similar research in future.

5.3 Presentation of the findings

Data was collected from the web-based questionnaires and semi-structured interviews. The study mix method design can be classified as explanatory sequential methods research. The MMR design which contains the first quantitative data collection, followed by qualitative data was used. On both occasions using these phases, the participants were LIS professionals and LIS directors form academic libraries in South Africa. The quantitative methodology was used to collect data obtained from all 91 LIS professional; therefore, the total population were total population of 91. The probability cluster sampling strategy technique was used to obtain responses from the respondents.

Objectives of the study

The objective was to explore the extent of adoption and maintenance of next ILS integrated by LIS professionals. The intended outcome of this study was to develop a model for the adoption and maintenance of next generation ILS for the current LIS environment in South Africa. Therefore, the objectives of the study were as follows:

O1]: To determine the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa.

[O2]: To identify the requirement of competencies amongst LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries in South Africa.

[O3]: To determine how privacy and security is maintained in the adoption of the next ILS in academic libraries in South Africa.

[O4]: To develop a model for decision making for the adoption and maintenance of the next generation ILS in academic libraries.

Each questionnaire and interview session opened with background information about the participant. The background information established the characteristics of the responding institutions and ascertained whether the person who was responding to the question was skilled to do so. The data collection proceeded into two phases with quantitative data collection in the first phase and random sampling in the second qualitative phase. The quantitative phase was used to plan the qualitative follow-up phase. The findings from the Web survey informed us of the sampling as well as the qualitative questions to be asked of the participants in the semi-structured online interviews with LIS directors that were exposed to the management of the next generation ILS. Since the findings from the Web survey were intended to be followed and explored in more depth with the interviews, the research findings of the Web survey are presented first in the chapter, followed by the findings of the semi-structured interviews with LIS directors.

5.3.1. Overall analysis of the quantitative data

5.3.1.1 Descriptive statistics

The web survey assessed the technological, user training and trust factors of LIS professionals in academic libraries in South Africa concerning adoption and maintenance of next generation ILS in the digital environment. Descriptive were employed for analysis of the Web Survey results, and the responses were categorized into themes. Findings were presented in tables, where possible quantitative findings from the instruments are captured in graphs and tables. The reliability of the multiple-point scale using ordinal questions under the sections of

technological factors, user training and data security. The overall results are presented in Table 5-2.

Item-Total Statistics						
Dimension	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item-Total Correlation**	**Squared Multiple Correlation**	**Cronbach's Alpha if Item Deleted**	**N of items**
Technological Factors	.59	.711	.618	.383	.819	3
User Training Factors	.49	.532	.390	.166	.613	3
Trust Factors (Data and security	1.87	4.596	.746	.582	.932	6

Table 5-2: Overall descriptive statistical analysis of the extent of adoption and maintenance of the next generation ILS at Public Universities in South Africa

As reflected in Table 5-2, data security has the highest mean score value (Mean = 1.87). Technological factors followed by user training factors has the lowest mean of (Mean = 0.59) and (Mean = 0.49). The results suggest more improvement on these areas, especially user training factors.

5.3.2 Technological factors impacting the adoption and maintenance of the generation ILS in academic libraries South Africa

This section undertakes a reliability analysis on constructed items on technological factors. Cronbach Alpha was run to determine if technological factors to be considered by libraries by LIS professionals affect the adoption of the next generation ILS in academic libraries. Table 5.2 shows the reliability score for ordinal questions in Section D (Q3) (Annexure A) on technological factors, as well as the matrix containing the "Corrected Item-Total Correlation for each item." All items in the inter-item correlation matrix table are positively correlated. On item 2, the correlation is acceptable at 0.722. Items 1 and 3 have a correlation of 0.697 and 0.618, which is questionable. Table 5.3 Reliability test for technological factors.

Item-Total Statistics						
Items	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item Total Correlation**	**Squared Multiple Correlation**	**Cronbach's Alpha if Item Deleted**	**N**
Technological Factors i.e., System Quality, Information quality, and After Sale Quality	.59	.711	.618	.383	.819	3
Organizational Factors i.e., Top Level Management Support and User Training	.77	.718	.722	.539	.711	
Librarians Factors i.e., Computer Self Efficiency and Librarians Experience	.76	.724	.697	.515	.735	

Table 5-3 Inter-item Correlation Matrix Table on Technological Factors

The overall reliability of 0.822 of technological factors indicates that this category of research has a strong association in terms of consistent scoring. The instrument becomes more dependable as the coefficient of alpha increases. Deleting any item would not increase the internal consistency. Table 5.4 below indicates the reliability test for the technological impact on the next generation ILS.

Reliability Statistics		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**n**
0.822	0.825	3

Table 5-4 Reliability Test for Technological Factors

5.3.3 User Training factors as factors to consider in the adoption of next generation ILS

Section reports on the reliability analysis on constructed items on user training qualities. Cronbach Alpha was run to determine training qualities as a training factor to be considered by libraries by LIS professionals affect the adoption of the next generation ILS in academic libraries. Table 5-5 shows the reliability score for ordinal questions in Section D (Q4) (Annexure A) on training qualities. The reliability score for ordinal questions on user training qualities in section was calculated, as well as the matrix containing the "Corrected Item-Total Correlation for each item." All items in the inter-item correlation matrix table are positively correlated. Item 1 has a poor correlation of 0.527, and items 2 and 3 have an unacceptable association of 0.419 and 0.390.

Item-Total Statistics						
Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	n
Training Curriculum	.55	.494	.527	.282	.409	3
User Commitment	.62	.599	.419	.206	.568	
Trainers' Personnel Skills and Competence	.49	.532	.390	.166	.613	

Table 5-5 Inter-item Correlation Matrix Table on User Training Qualities

The overall reliability of 0.633 indicates that this category of research has a questionable association in terms of consistent scoring. The instrument becomes more reliable as the coefficient of alpha increases. Deleting any item would not increase internal. consistency. Table 5-5 below shows the reliability test for user training qualities.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	n
0.633	0.635	3

Table 5-6 Reliability for User Training Qualities

5.3.4 Data and network security compliance Public Universities in South Africa

This section set out the reliability of To Cronbach Alpha was run to determine the reliability score for ordinal questions in Section F (Q5) on data and network security compliance in next generation ILS to assist you in maintaining data security compliance on the next generation ILS was calculated. The matrix is shown in Table 5.7 below highlights the matrix containing the "Corrected Item-Total Correlation for each item. The inter-item correlation matrix table, all items are positively correlated. There is a good correlation between 0.835, 0.871, 800 and 0.807 on items 1, 3, 4, and 5. There is an acceptable correlation of 0.798 and 0.746 between items 2 and 6.

Item-Total Statistics					
Items	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item-Total Correlation**	**Squared Multiple Correlation**	**Cronbach's Alpha if Item Deleted**
Do not install unapproved software	1.81	4.378	.835	.724	.921
Think before opening e-mail attachments	1.82	4.453	.798	.668	.926
Use strong unique password, and never share it	1.76	4.279	.871	.789	.916
Lock down your computer when away from the desk during the day	1.86	4.495	.800	.695	.925
Shutdown your computer when you leave for the day	1.85	4.468	.807	.699	.924
Schedule an antivirus scan for your computer with CTS/IT department	1.87	4.596	.746	.582	.932

Table 5-7 Item-Total Statistics Data and Network Security Compliance

The overall reliability 0.936 indicates that this category of research has an excellent collaboration in terms of consistent scoring. The instrument becomes more reliable as the coefficient of alpha increases. Deleting any item would not increase internal consistency. Table 5.7 below indicate the reliability test on data level level of data protection awareness.

Reliability Statistics		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**n**
0.936	0.936	6

Table 5-8 Reliability of Data and network security compliance

5.4 Presentations of quantitative findings for the web-based survey of LIS professionals at Public Universities

This section presents the findings of the web-survey. The researcher emphasis on technological, training (competencies) and trust factors (data security) were investigated as objectives of the study. The responses were grouped and correlated in terms of themes. The findings are presented in the form of tables and graphs.

5.4.1 Demographic information of participants

This section presents the biographical business information of participants.

5.4.2 Distribution by Gender

Table 5-9 presents the gender of participants.

Gender	n	%
Male	37	40.7%
Female	54	59.3%
Other	0	0.0%
Total	**91**	**100.00%**

Table 5-9 Distribution of Gender

Table 5-9 shows the gender of the study participants. According to the table, 37 (41%) of the 91 respondents who participated in the study was male, while 54 (59%) are female. Other than males and females, there were no other sexual orientations. Although the other option for sexual inclusiveness was included in the survey under gender, none of the 91 participants responded to this item.

5.4.2 Distribution by Age

Table 5-10 presents the age of participants.

Age	n	%
Under 18	0	0.00%
18-24	1	1.1%
25-34	12	13.2%
35-44	31	34.1%
45-54	31	34.1%
55-64	16	17.6%
Above 64	0	0.0%
Total	**91**	**100.00%**

Table 5-10 Distribution of Age

The age distribution of the participants in the study is shown in Table 5-9. Of the 91 participants only 1 (1%) participant were between the ages of 18 and 24. 12 (13%) are within the range of 25-34; 31 (34%) are within the age range of 35-44; and 31(34%) are within the age range of 45-54; 16 (18%) are between the ages of 55 and 64; and there are no participants over 64 and 18yrs. It shows there were no participants below the age of 18 and over 64 in the survey.

5.4.3 Qualifications of Participants

Table 5-11 presents the qualifications of participants.

Educational Level	n	%
Degree	42	46.15%
Masters	26	28.57%
Matric	5	5.49%
Diploma	3	3.30%
PhD	3	3.30%
Other	2	2.20%
Total	**81**	**100.00%**

Table 5-11 Qualifications of participants

Table 5-11 shows the educational backgrounds of study participants. This item received eighty-one (81) responses from LIS professionals. A degree qualifies for the most qualifications (from traditional universities) and 42 (46%) of LIS professionals have a degree; a significant number of LIS professionals surveyed 26 (29%) have a master's degree in library and information science (from both traditional and universities of technology); 5 (5%) of the participants have Matric with other non-LIS qualifications; these participants have other specialized qualifications in Information Technology and work as LIS professionals (from a university of technology); 3 (3%) respondents have a PhD in the field of study; the other 3 (3%) hold a hold a diploma obtained from previous Technikons now known as University of Technology hold a diploma. Finally, 2 (2%) have additional qualifications listed as Postgraduate Diploma.

5.4.4 Organizational Affiliation

Table 5-12 presents distribution of organizational affiliation.

Table 5-12 Distribution of organizational affiliation

Institution	n	%
CPUT	40	45.5%
UWC	6	6.8%
UCT	6	6.8%
UL	5	5.7%
UJ	4	4.5%
CUT	4	4.5%
NWU	3	3.4%
DUT	3	3.4%
WUSU	3	3.4%
WITS	2	2.3%
UNISA	2	2.3%
VUT	2	2.3%
MUT	2	2.3%
UKZN	2	2.3%
SPU	1	1.1%
UNIVEN	1	1.1%
SOL PLAAITJIE	1	1.1%
Total	**87**	**100.00%**

To determine their organizational affiliation, respondents were asked to state their current employment. The Cape Peninsula University of Technology (CPUT) had the highest number of participants 40 (45%). Other academic institutions responded minimally, with the University of the Western Cape (UWC) and the University of Cape Town (UCT) accounting for 6 (7%) of the total. The average response at the University of Limpopo (UL) was 5 (6%), while the average response at the University of Johannesburg (UJ) and Central University of Technology (CUT) was 4 (5%). Walter Sisulu University (WUSU) and Durban University of Technology each had 3 (4%) participants; the average response from the University of Witwatersrand (Wits), the University of South Africa (UNISA), Vaal University of Technology (VUT), Mangosuthu University (UM), and the University of Kwa-Zulu Natal (UKZN) was 2 (2%). Finally, Nelson Mandela University, Sol Plaaitjie University (SPU), and the University of Venda received an average response of one percent. Eighty-eight (88) of the 91 LIS professionals responded, while three did not. 1 participant selected UP (University of Pretoria) even though UP was excluded on the study.

5.4.5 Distribution of Departments

Respondents were asked to identify the department in their library to which they belonged. The distribution of departments is depicted in Table 5-13.

Table 5-13 Distribution of Departments

Departments	n	%
User/Client Services	55	60.4%
Technical Services	15	16.5%
Other	12	13.2%
ICT/IT	9	9.9%
Total	**91**	**100.0%**

The highest number of participants 55 (60%) work in the User/Client Services department; 15 (16%) of the participants work in the Technical Services department; 12 (13%) indicated that they work in other departments under the User/Client Services department despite being given the option to select in the survey; and 9 (10%) indicated that the work at ICT/IT department.

5.4.6 Distribution of Role in the Organization

Figure 5-1 illustrates the role played by participants in the organizations.

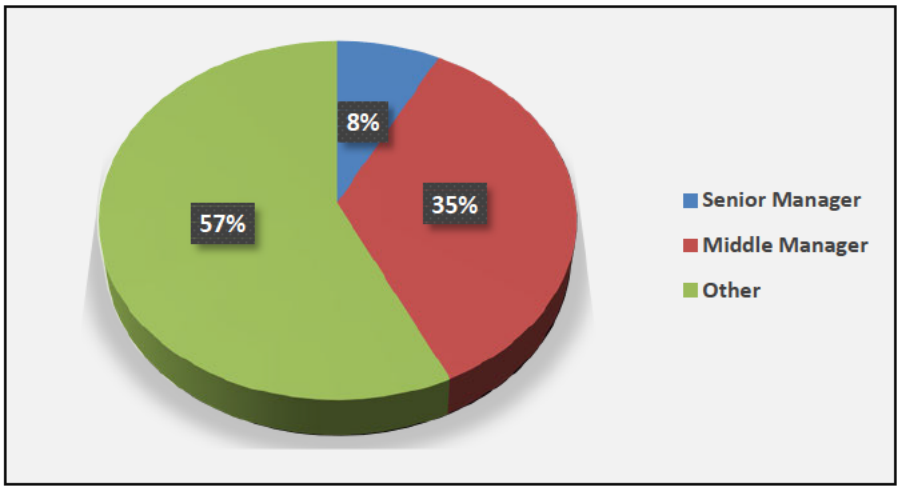

Figure 5-1 Distribution of Role in Organization

A total number of 91 LIS professionals were asked to list their roles in their organization. It is indicated that 7 (8%) of the participants exercise a senior management role in the organization; 32 (35%) are middle managers in the organization, and other 52 (57%) of the participants hold distinct roles in the organization.

5.4.7 Distribution of Years of Experience

The distribution of participants in terms of the number of years they worked in the organization is depicted in Figure 5-2. It shows that 4 (4%) of the 91 participants have worked for the organization for less than a year; 14 (15%) have worked for the organization for 1-3 years; 18 (19%) have worked for the organization for 4-6 years; 13 (14%) have worked for the organization for 7-10 years; and 42 (46%) have worked for the organization for more than 10 years.

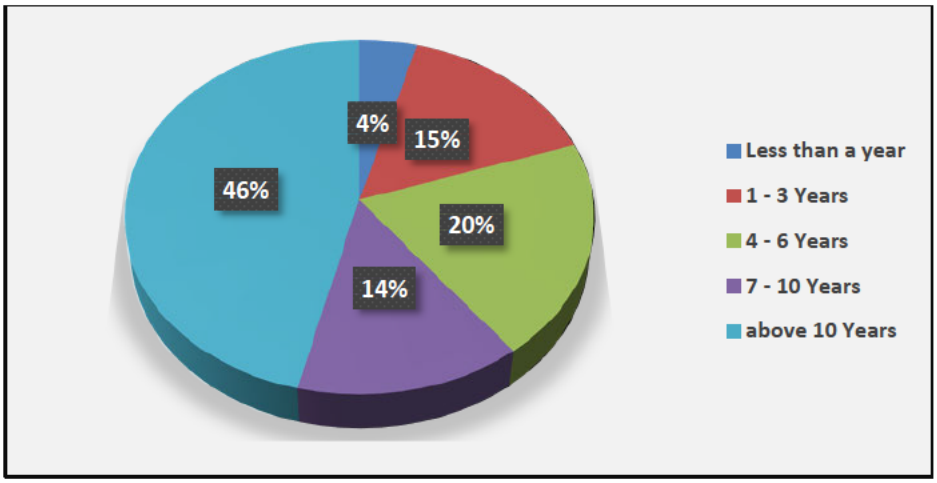

Figure 5-2 Distribution Years of experience

5.5 Technological factors impacting the adoption of next generation ILS

This section covered technological impact of the ILS of the Web Survey.

5.5.1 Types of the next generation ILS

LIS professionals were provided with the list of next generation ILS they are currently using in their libraries. Respondents were required to choose one option provided to select the next generation ILS they are currently using, if not listed to choose other as an option and indicate the other type of system they use in their libraries. Figure 5-3 shows the next generation integrated library system currently use by LIS professionals to manage library resources. This item received responses from all 91 LIS professionals. According to the responses, more than half of the respondents 53 (58%) use ALMA (Ex-Libris) as their Library Management System (LMS); 28 (31%) use Sierra (Innovation) new upgraded version and 4 (4%) said they use the open-source system called Open Library Foundation's (Folio), and another 6 (7%) indicated that they use are SirsiDynix, WorldShare (OCLC). One respondent stated that this item did not apply to them because they have not yet migrated to the next-generation ILS.

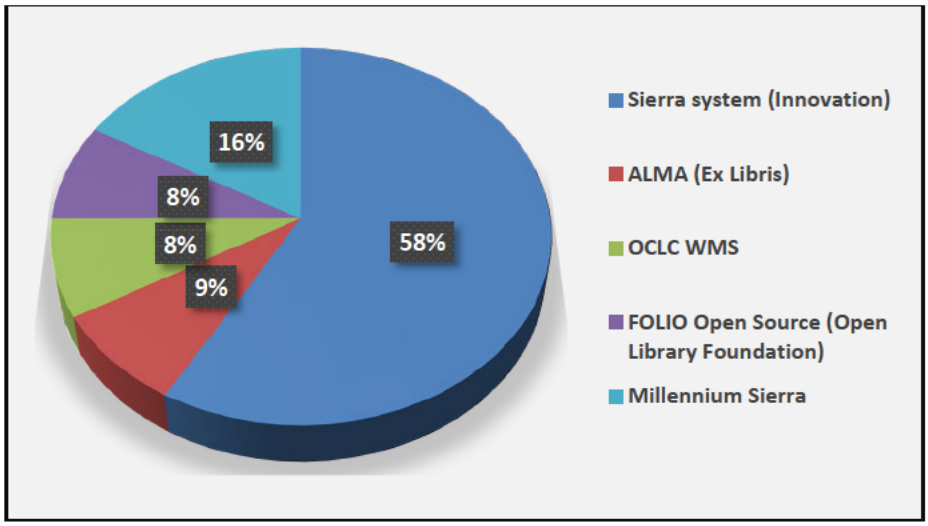

Figure 5-3 Types of Next Generation ILS Currently Used by LIS Professionals

5.5.2 Traditional ILS used by LIS professional prior adoption of the next generation ILS

LIS professionals Participants were asked to indicate which traditional ILS system they previously used as their library management system prior to their current system (next generation ILS. Respondents were required to choose one option, if not listed to choose other as an option to indicate the type of traditional ILS system they used in their library prior next generation ILS. According to Table 5-14 indicate that 118 participants more than half of the respondents, 51 (57%), used ALEPH (Ex-Libris) as their previous traditional system, while more than a quarter, 28 (31%) used Millennium (Innovative) and Polaris (Innovative), while other 11 (12%) use other systems like Symphony and old traditional Millennium system replaced by new Innovative Sierra system. The figures we more that 100% because participants listed more than one option of the system previously used.

Table 5-14 Traditional ILS currently used by LIS professionals

Next generation traditional ILS currently used by LIS professionals	n	%
ALEPH (Ex-Libris)	51	**57.1%**
Millennium (innovation)	28	30.8%
Polaris (Innovation)	28	30.8%
Other	11	12.1%
Total	**118**	**130.8%**

5.5.3 Factors considered before adopting the next generation ILS

The researcher asked participants who indicated that they use next generation ILS to mark the relevant factors considered before adopting the next generation ILS in their libraries. All 91 respondents participated on the survey. Some questionnaire participants who indicated they used next generation ILS marked the factors relevant to adopting the next generation ILS in their libraries. Table 5-15 shows factors to be considered before the adoption of next generation ILS.

Table 5-15 Factors Considered Before Adopting the Next Generation ILS

Factors	n	%
Technological Factors: System Quality, Information quality, and After Sale Quality	80	87.9%
Librarians' factors: computer self-efficiency and librarian experience	52	57.1
Organizational Factors: Top Level Management Support and User Training	25	27.1%
Total	**157**	**172.1%**

Technological factors were highly cited (88%) by participants. Librarians' factors were frequently mentioned by 52 (57%). While 25 (27%) said they considered organizational factors User training qualities may be considered when considering user training as a factor for the adoption of Next-generation integrated ILS.

5.5.4 User training qualities considered when considering user training as a factor for the adoption of the next generation ILS

User training characteristics identified by participants indicated aspects they believed were crucial in deciding whether to adopt next-generation integrated library systems. All 91 respondents completed the study. Table 5-16 demonstrate that, when considering user training prior to the adoption of the next-generation ILS in their libraries, 60 (66%) consider the personnel skills and competence of trainers. 49 (53%) people mentioned the training curriculum frequently. 36 (40%) respondents mentioned user commitment. Respondents who selected other mentioned that they believe that user experience is an additional factor to consider, as indicated by the 3 (3%) respondents who chose other.

Table 5-16 User Training Qualities of LIS Professionals

Training Qualities	n	%
Trainers' Personnel Skills and Competence	60	65.93%
Training Curriculum	49	52.75%
User Commitment	36	39.56%

Other	3	3.3%
Total	**148**	**161.54%**

5.5.5 Significant problems experienced by LIS professionals in the adoption and maintenance of the generation ILS

Participants were asked to list any key issues on problems they had encountered during the adoption and maintenance of the next-generation ILS in their libraries. This item received 91 responses from participants. Table 5-17 demonstrate that, out of 91 participants, 58 (64%) of the respondents reported having difficulties adopting and maintaining the next-generation ILS in their libraries, while 33 out of 91 (36%), reported having no such difficulties.

Table 5-17 Problems Experienced by LIS Professionals in the Adoption and Maintenance of Next Generation ILS

Response	n	%
Yes	58	63.74%
No	33	36.26%
Total	**91**	**100.00%**

Participants who indicate "Yes" were asked to give reasons to their comment. Table 5-18 and summarizes the comments for more detail response of LIS professionals who indicated that they have experience significant problems in the adoption of the next generation LIS in their libraries. Five themes: lack of staff training, data migration, system functionality, technical expertise, data security and vendor support were created as indicated in Table -5-18.

Table 5-18 Problems Experienced in the Adoption and Maintenance of the Next-Generation ILS

Comments	Themes	n	%
Librarians need training. There is a need to look at institutional infrastructure and LIS IT skills limitations.	Lack of staff training	50	54.9%
The biggest of implementing a new system is challenges of data migration and system integration. Migration data to the new cloud-based platforms can be problematic	Data migration	25	27.5%
Problems with login and passwords. There is a	System functionality	25	27.5%

problem with system compatibility			
Technical expertise and user problems	Technical expertise	20	21.98%
Sometimes the data on cloud can be on risk because of hacking.	Data security	8	8.8%
Vendor support and training on the system is needed	Vendor support	8	8.8%
Staff are reluctant to change especially older generations.	Change management	8	8.8%

The findings reveal that 55% of respondents highly cited that there is lack of staff training and LIS professionals limitation in delivering library IT mandate because of lack institutional IT infrastructure to support the library; 27% frequent cited data migration and system functionality as significant problems in the adoption and maintenance of the next generation ILS; lack of LIS technical expertise in the system was cited 22% by respondents; in addition, 9% thought that data privacy and security were problematic because next generation ILS are hosted on cloud; another 9% of respondents mentioned that vendor support and training is needed before implementing a new system, while other mentioned that change management is a challenge especially in the older generation LIS professionals because of fearing adopting to the latest technologies.

5.5.6 Failures in the implementation of next-generation ILS in your library

Participants were asked to select the best answer in reducing failures in the implementation of a next-generation cloud-based ILS in their library. Ninety-one people responded to this item. Table 5-19 and show the six themes and responses of LIS professionals.

Table 5-19 Failures in the Implementation of Next-Generation ILS in the Library

Comments	Themes	n	%
Everyone should be involved, and the objectives of the organization should be communicated to everyone within the organization	Staff Involvement	71	78.00%
Provide a demo at least 6 months before the implantation stage and force every staff member to give feedback from the demo.	Vendor Support	60	65.9%
Strong support from ICT department Skills and Tools to support cloud-based library.	Interdepartmental Communication	55	60.4%
Openness to learn and report any	Top Level Management Involvement	46	50.5%

problems experienced with the new system to senior management			
Conduct survey for academic staff and students	Data Analysis and conversation	46	50.5%
Project Management	Other	6	6.6%

The findings revealed that most respondents 78% indicated that staff involvement can reduce failures in the adoption of next-generation ILS in their libraries, 66% of respondents chose vendor support and 60% selected inter-departmental communication, 50% chose top level management involvement, and data analysis and conversation. Six percent of respondents indicated that project management and institutional ICT support might help prevent failures in the adoption of next-generation ILS. Figure 5-15 displays themes created by failures in the implementation of the next generation ILS.

5.5.7 Improvement of the adoption of next generation ILS

The researcher asked LIS professionals to freely express their thoughts on how to improve next generation adoption and maintenance in their libraries. Table 5-24 summarize the key comments made by 91 LIS professionals who participated in the survey. Participants were allowed to select more than one response. Nine themes were created as indicated in table 5-20.

Table 5-20 Response Improvement in the Adoption of Next-Generation ILS by LIS Professionals

Comments	Themes	n	%
A clear line of communication including participation of all staff across all levels. Always consult, plan, and communicate with staff.	Communication and consultation	28	30.8%
Sharing knowledge and striving for future collaborations	Knowledge sharing	17	18.7%
Researching if APIs are available for better integration before purchasing, more system integration, e.g., repositories for data and digital archival collections.	System integration	17	18.7%
Project Management in software/system evaluation is crucial.	Project Management	12	13.2%
The IT staff must get proper training	Staff training	12	13.2%
Vendor technical support with regards to migration.	Vendor Support	8	8.8%
Adopting new technology or system should contain modern trends.	Change management	6	8.8%

The library must ensure that the system is secure to use. Firewall issues should be addressed with CTS before the acquisition of the system.	System evaluating	2	2.2%
Using cloud-based services can streamline library services and minimize cost.	Budget	2	2.2%

The findings reveal that most respondents (31%) indicated that proper staff consultation and communication are always required prior to the adoption of next-generation ILS, particularly when new software is being considered for purchase. This will facilitate knowledge sharing and future collaborations among libraries in data sharing and shared systems for the purpose of purchasing a unified system used by all academic libraries, cited by 19% of respondents. Project Management and staff training were recommended, according to 13% of participants, for improving the adoption and maintenance of the next ILS in their libraries. In addition, 8% mentioned that staff motivation in adapting to the newest technologies by top-level management must be highly considered before implementing the next-generation ILS. Lastly 2% of respondents who selected others indicated that data security and budget are the other important significant aspects for the improvement of the system adoption and ensuring that data privacy and security are considered before the implementation of a new system.

5.6 Library and Information Science (LIS) competencies in the adoption and maintenance of next generation ILS

A total of 91 participants were asked to select which LIS skills and knowledge are required/not required in the adoption and maintenance of next generation ILS in their libraries.

5.6.1 Generic skills

Table 5-21 displays the generic skills required/not required by LIS professionals for the adoption and maintenance of next-generation ILS in their libraries. The findings reveals that the total number of generic skills required were 89%, and not required were 11%.

Table 5-21 Generic Skills Required and Not Required by LIS Professionals

Skills	Required	% Required	Not Required	% Not Required	Total
Communication	87	96.67%	3	3.33%	90
Adaptability	87	96.67%	3	3.33%	90

Creativity	65	77.38%	19	22.62%	84
Analytical skills	81	91.01%	8	8.99%	89
Problem solving	84	94.38%	5	5.62%	89
Presentation skills	67	77.01%	20	22.99%	87
Time management	73	82.95%	15	17.05%	88
Decision making	81	91.01%	8	8.99%	89
Customer relationship	87	96.67%	3	3.33%	90
Flexibility	88	96.70%	3	3.30%	91
Assertiveness	70	83.33%	14	16.67%	84
Stress management	65	79.27%	17	20.73%	82
Interpersonal skills	78	88.64%	10	11.36%	88

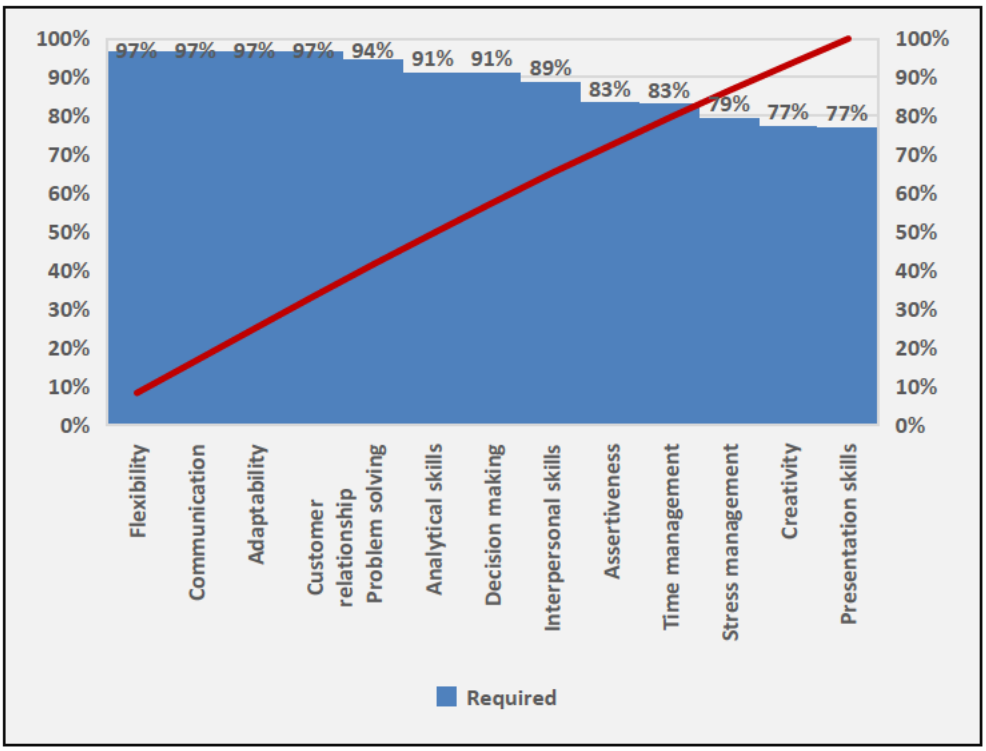

Figure 5-4 Generic Skills Required (%)

Figure 5-4 shows the responses of 91 participants generic skills that are not required for the adoption and maintenance of next-generation ILS in their libraries. These responses included: 23% respondents who indicated that creativity and presentations skills are not required ; 21% indicated that stress management is not required; 17% respondents selected time management and assertiveness as skills not required; 11% respondents selected interpersonal skills as a skill not required; 9% respondents selected analytical and decision making skills; 6%

respondents selected problem solving as a skill not required; and 3% selected communication, adaptability, customer relationship and flexibility as skills not required.

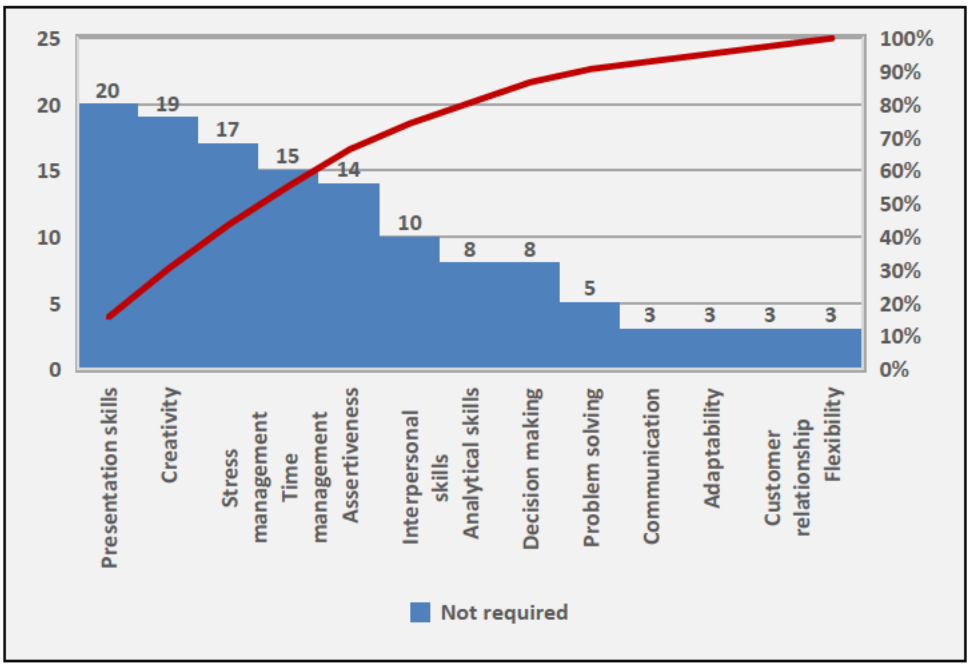

Figure 5-5 Generic Skills Not Required

5.6.2 Managerial Skills

Table 5-22 and Figure 5-6 displays the findings show managerial skills required/or not required by LIS professionals on the adoption and maintenance of the next generation ILS in their libraries. The findings reveals that the total number of managerial skills required were 95%, and not required were 5%.

Table 5-22 Managerial Skills Required and Not Required by LIS Professionals

Skills	Required	% Required	Not Required	% Not Required	Total
Planning and organizational skills	87	96.67%	3	3.33%	90
Finance management skills	75	84.27%	14	15.73%	89
Local and global thinking	83	98.81%	1	1.19%	84
Managing change	90	98.90%	1	1.10%	91
Team building	84	93.33%	6	6.67%	90
Leadership	87	96.67%	3	3.33%	90
Project management	88	97.78%	2	2.22%	90
Consumer management skills (User need analysis, Information seeking, behaviour analysis)	83	95.40%	4	4.60%	87
Resources management	87	98.86%	1	1.14%	88
Negotiation skills	82	92.13%	7	7.87%	89

The findings on managerial skills needed to adopt and maintain the next ILS in their libraries shows that 99% respondents required local and global thinking, managing change and resources sharing as kills requires; 98% of respondents required project management; (98%) needed project management; 97% respondents required leadership, planning, and organizational skills; 95% respondents required consumer management skills (user need analysis, Information seeking, behaviour analysis); 93% of the respondents required team building; 92% respondents required negotiation skills; and 84% respondents required finance management skills.

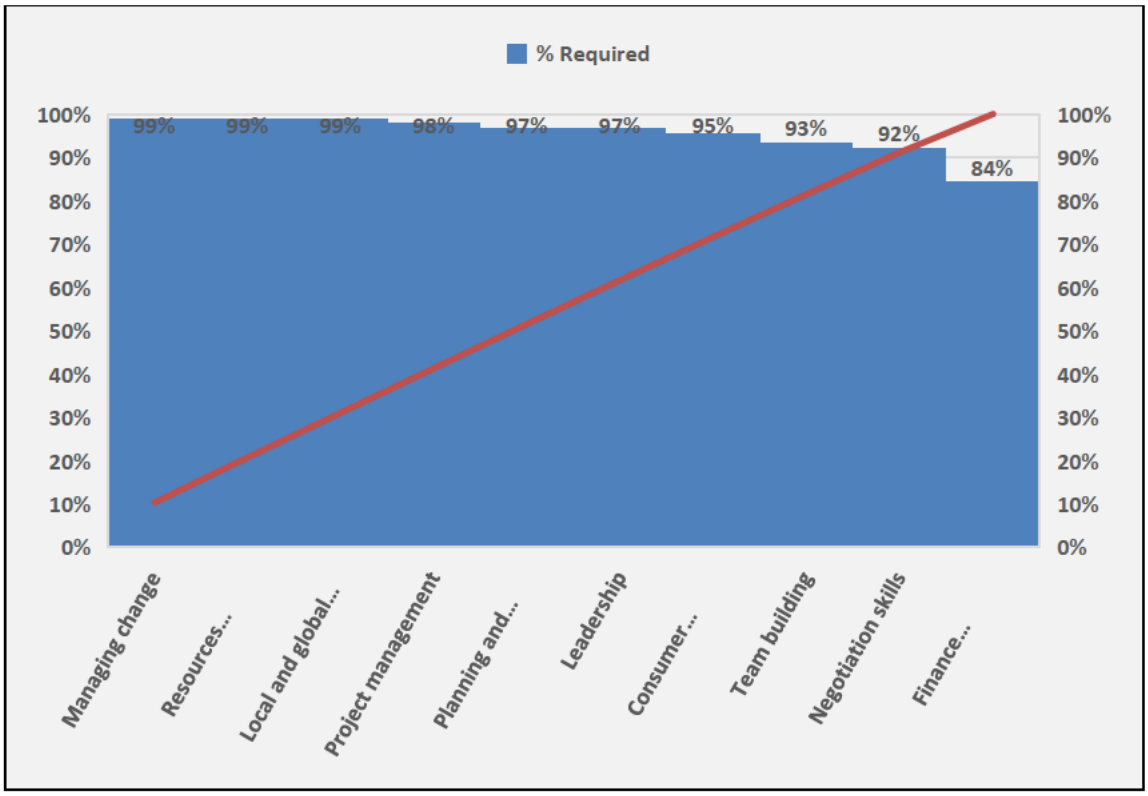

Figure 5-6 Managerial Skills Required (%)

Figure 5-7 displays the opinions of 91 participants on the managerial abilities not required for their libraries to adopt and maintain the next generation ILS. The findings reveal that 16% respondents thought that management and finance were not required skills; 8% respondents believed that negotiation was not required; 7% of respondents said that team building was not required; 5% respondents said that consumer management skills (user need analysis, Information seeking, behaviour analysis) were not required; 3% of respondents thought leadership, planning and organizational skills were not required; 2% respondents thought that project management wasn't required. Lastly 1% of respondents said that local and global thinking, managing change and resources management were skills not required.

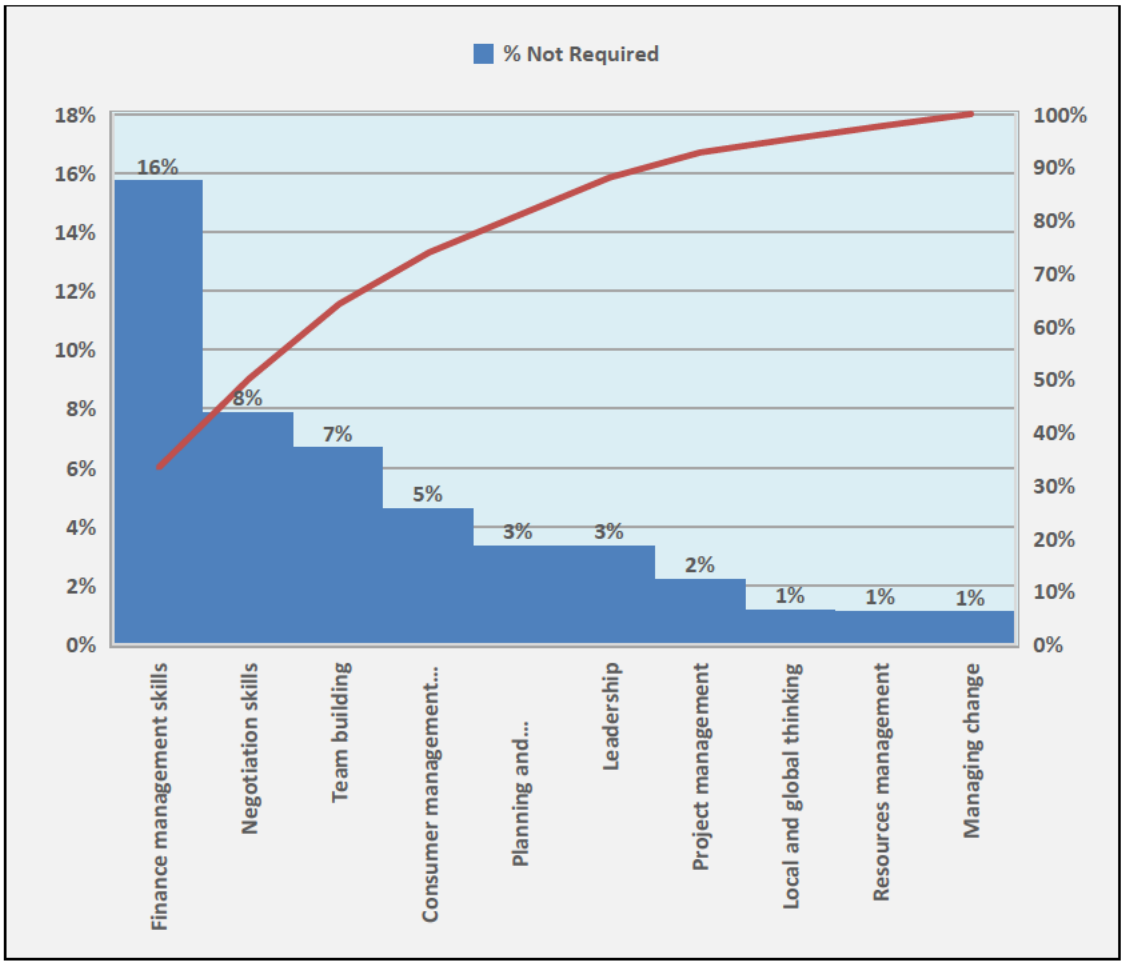

Figure 5-7 Managerial Skills Not Required (%)

5.6.3 Professional IT skills

Table 5-23 show responses of 91 participants in professional IT skills require/or not required for the adoption and maintenance of the next generation ILS in their libraries. The results reveals that the overall number of IT skills required by LIS professionals are 93%, while not requires are 7%.

Table 5-23 IT Skills Required and Not Required by LIS Professionals

Skills	Required	% Required	Not Required	% Not Required	Total
Internet e.g., E- Mail management, Intricacies of internet search tools	84	98.82%	1	1.18%	85
Networking skills	84	97.67%	2	2.33%	86
Library automation	83	96.51%	3	3.49%	86
Hardware/ software Skills	84	93.33%	6	6.67%	90
Intranet skill	78	89.66%	9	10.34%	87
Presentation software e.g., PowerPoint	79	89.77%	9	10.23%	87
MS-suite	74	88.10%	10	11.90%	84

Figure 5-6 displays the responses of 91 participants on the professional IT skills needed to adopt and maintain the next ILS in their libraries. The findings show that 99% of respondents required knowledge of the internet (e- mail management, intricacies of internet search tools); 98% required networking skills; Eighty-three (97%) required library automation; 93% required hardware/ software skills. 90% of respondents required intranet skills, and presentation software (PowerPoint); 88% required MS-Suite knowledge.

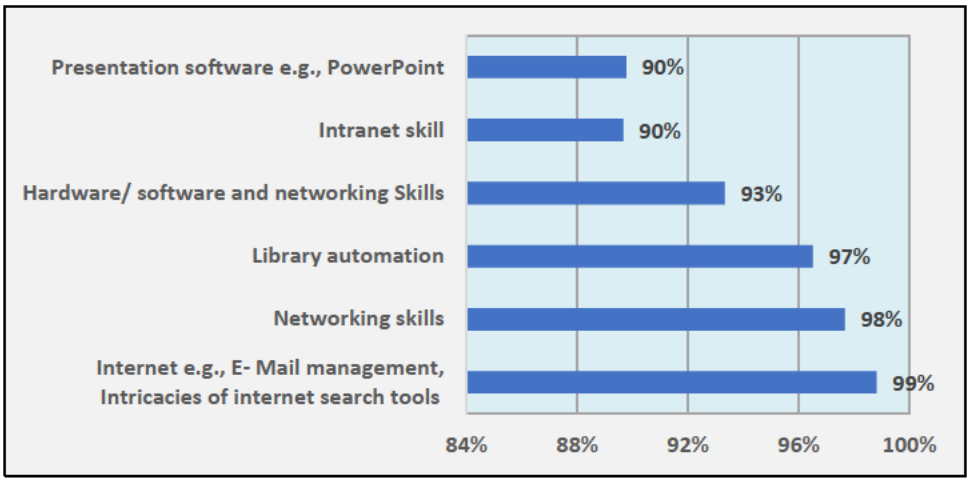

Figure 5-8 Professional IT Skills Required (%)

Figure 5-7 below shows responses of 91 participants in professional skills (IT Skills) not required for the adoption and maintenance of the next generation ILS in their libraries. The findings reveal that 12% respondents considered MS-suite as a skill not required; 10% respondents considered presentation software e.g., PowerPoint and intranet skill as a skill not required; 7% considered Hardware/ software Skills as skills not required; 3% of respondents

considered library automation as skills not required; 2% respondents considered networking skills, while 1% of respondents considered internet e.g., (e- mail management, intricacies of internet search tools) as a skill not required.

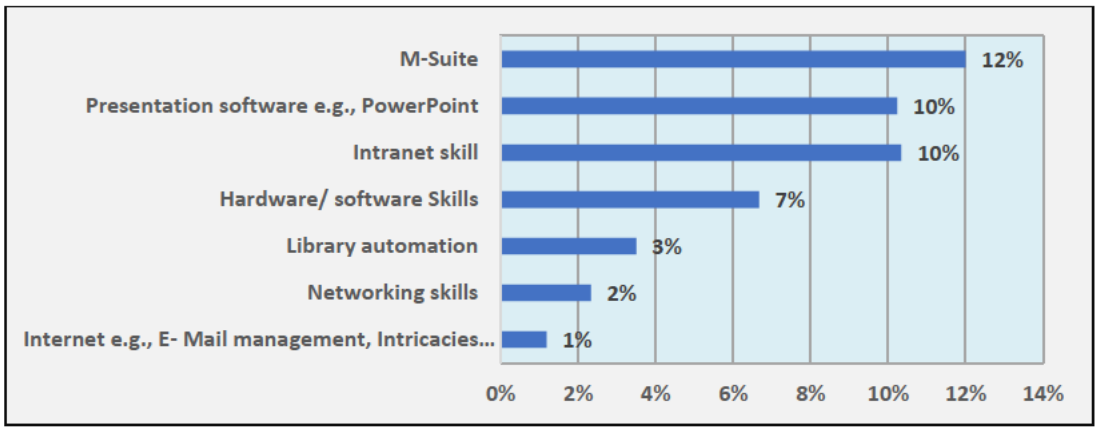

Figure 5-9 Professional IT Skills Not Required (%)

5.6.4 Technical skills

Table 5-24 shows technical skills required and not required for the adoption and maintenance of the next generation ILS in their libraries. The results reveals that the overall number of information technical skills required by LIS professionals are approximately 90%, while not required skills amount to 10%.

Table 5-24 Technical Skills Required and Not Required by LIS Professionals

Skills	Required	% Required	Not Required	% Not Required	Total
Information resource management	87	95.60%	4	4.40%	91
Metadata standards e.g., Dublin core, MARC, TEI2, XML3 etc.	82	93.18%	6	6.82%	88
System development	82	92.13%	7	7.87%	89
E- serial management	71	85.54%	12	14.46%	83
Standards e.g., Z39.50	68	83.95%	13	16.05%	81
390	90.08%	42	9.92%	432	390

Figure 5-8 below displays the opinions of 91 participants on technical skills that are not required for the adoption and maintenance of the next generation ILS in their libraries. The findings show that 96% of respondents selected information resource management as a skill

requires; 93% selected metadata standards, while 92% mentioned system respondents mentioned system development as skill a skill required, and 86% selected E-serial management as a skill not required; and 84% respondents said Standards (Z39.50) are skills required.

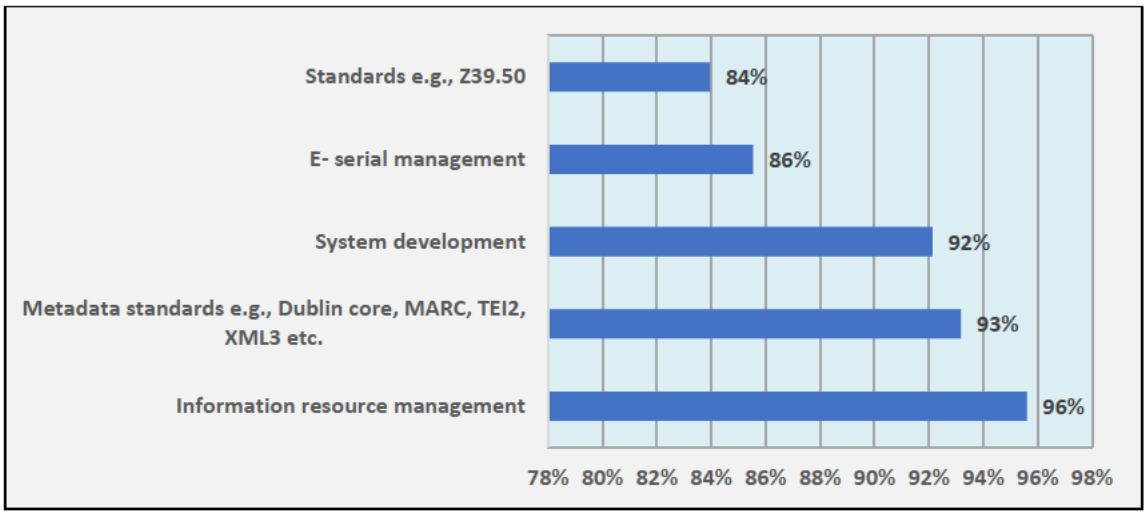

Figure 5-10 Technical Skills Required by LIS Professionals (%)

Figure 5-9 shows responses of 91 participants in professional skills (IT Skills) not required for the adoption and maintenance of the next generation ILS in their libraries. The findings reveal that 13 (16%) respondents considered Standards (e.g., Standards e.g., Z39.50); 12 (14%) respondents indicated that E-serial management is a skill not required, 7 (8%) respondents considered Metadata standards (e.g., Dublin core MARC, TEI2, XML3 etc.) as a skill not required; 4 (4%) respondents indicated information resources management as a skill not required.

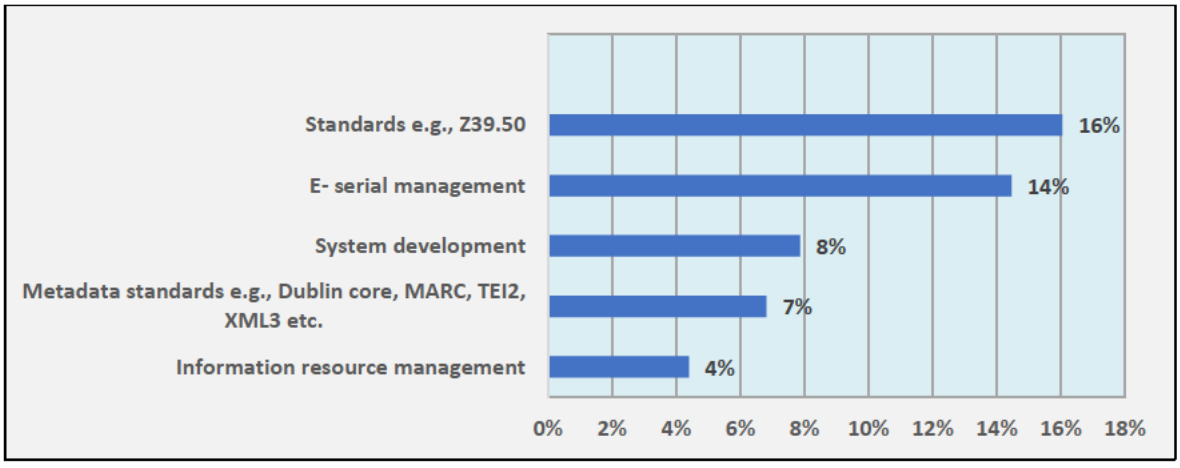

Figure 5-11 Technical Skills Not Required by LIS Professionals (%)

5.6.5 Library 4.0 skills

Table 5-25 Fourth Industrial Revolution skills required/not required for the adoption and maintenance of the next generation ILS in their libraries. The results reveals that the overall number of Information Library 4.0 skills required by LIS professionals are 92%, while not requires are 9%.

Table 5-25 Library 4.0 Skills Required and Not Required

Skills	Required	% Required	Not Required	% Not Required	Skills
Critical thinking and analysis	90	98.90%	1	1.10%	91
Information curation	87	95.60%	4	4.40%	87
Digital scanning, preservation	81	91.01%	8	8.99%	89
Cloud data expansion	82	91.11%	8	8.89%	90
In-depth research skills	77	87.50%	11	12.50%	88
Technology design and programming	77	85.56%	13	14.44%	90
Emotional intelligence	73	82.95%	15	17.05%	88

Figure 5-12 show responses of 91 participants in technical skills required for the adoption and maintenance of the next generation ILS in their libraries. The findings shows that 99% respondents required critical thinking and analysis skills; 96% required respondent information curation as a skill not required; 91% respondents required digital scanning, preservation skills and cloud data expansion as skills required; 87% respondents considered In-depth research, technology design and programming as skills required; 86% considered technology design snd programming, and 83% respondents considered emotional intelligence skills required.

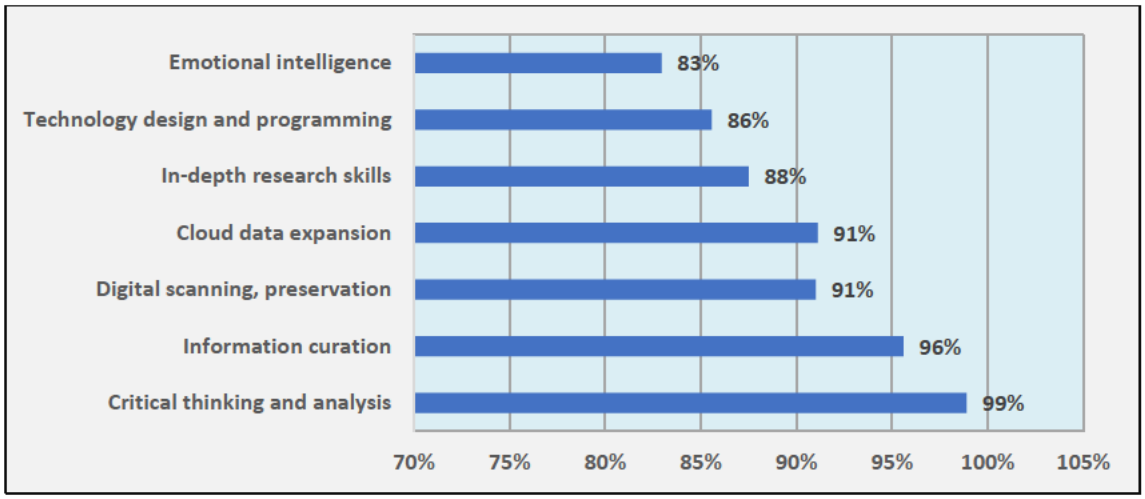

Figure 5-12 Library 4.0 Skills Required (%)

Figure 5-13 show responses of 91 participants in technical skills not required for the adoption and maintenance of the next generation ILS in their libraries. Fidings shows that 17% considered emotional intelligence as a skill not required; 14% considered Technology design and programming as skills not required; 13% respondents considered In-depth research as a skill not required; 9% respondents considered digital scanning, preservation and cloud data expansion as a skills not required; 4% considered informtion curation as a skill not required; and 1% of respondents critical thinking and analysis as a skill not required.

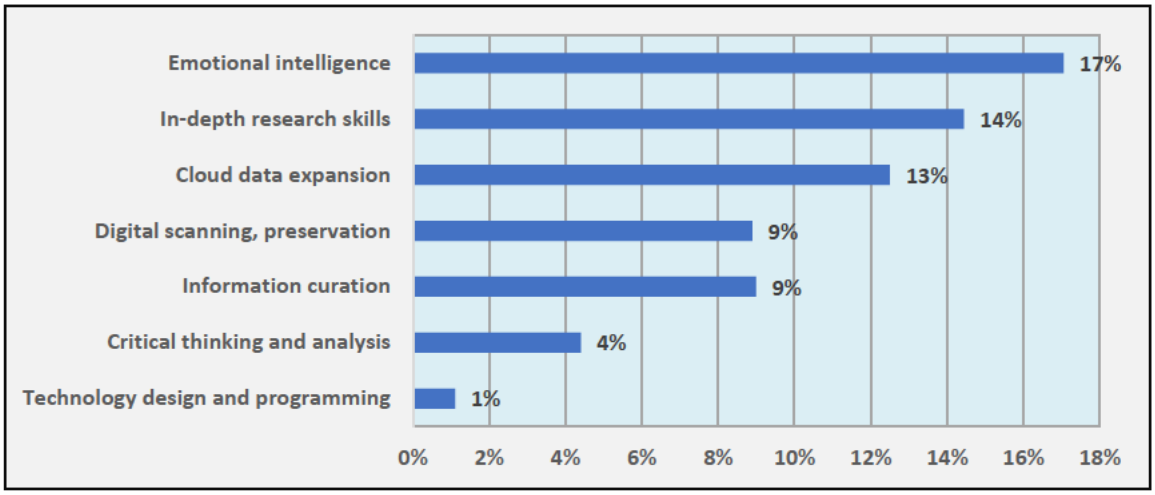

Figure 5-13 Library 4.0 Skills Not Required (%)

5.7 Role of Consortium in Academic

To determine the role of consortiums in the adoption and maintenance of next generation ILS in academic libraries, respondents were asked to name a consortium that they belong to in their institutions. Figure 5-14 below demonstrates that more than half 46% of LIS professionals are members of the CALICO, currently known as the CHELiN; 12% are members of the SEALS ; and the remaining 29% who chose other said it does not apply to their libraries because the consortiums in their provinces have been discontinued. Respondents mentioned that they once belonged to previous consortiums, such as EsSAL, FRELICO, and GAELIC , all of which were shut down ten years ago. They stated SEALS and CHELiN, used by sister universities in the Eastern Cape and Western Cape, respectively are the only remaining consortiums that to collaborate, network, and share best practices for managing ILS in libraries.

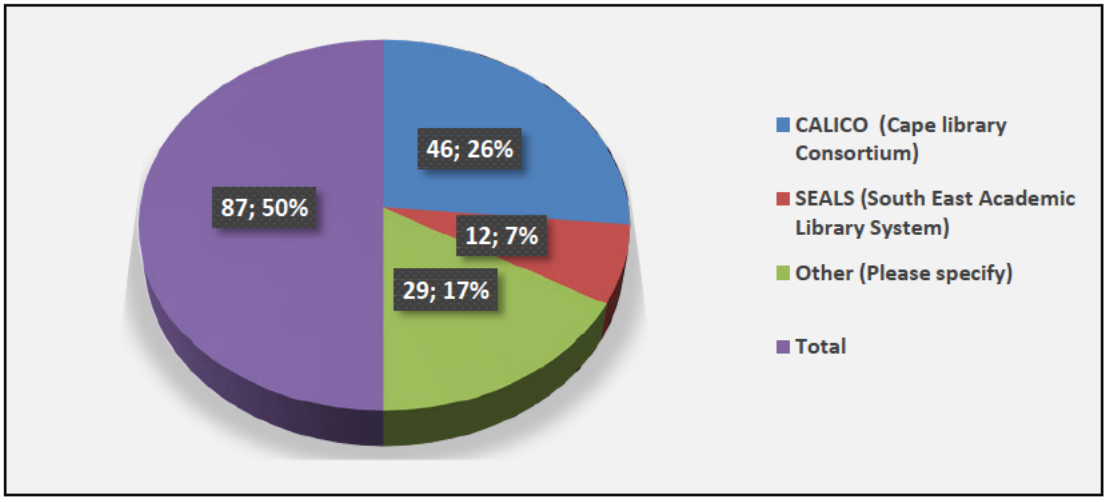

Figure 5-14 Role of Academic Libraries Consortium

5.7.1 Value of Academic library consortium

In determining whether consortium efforts are delivering value to their institutions, Figure 5-15 below, shows 85% concur that the consortia's efforts contribute to the value of their libraries. In response to the claim that consortia efforts do benefit libraries, 15% respondents disagreed.

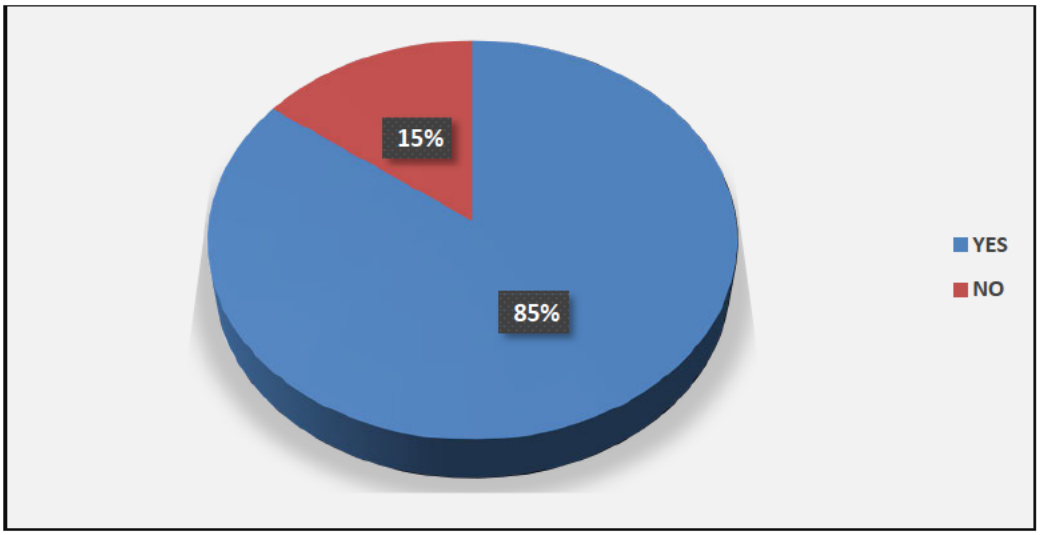

Figure 5-15 Value of Library Consortium

5.7.2 Support from consortium in improving academic libraries' automation status

The reasons given are on how the support of consortium will enhance libraries' automation status. Only 45% of participants gave a response to this question, and the remaining participants said they were unsure of whether a consortium could improve a library's automation status. Unfortunately, participants did not adequately address this item. The survey's response to the question was insufficient. Some said they were unsure or unaware of library consortia. Other participants brought up other consortiums like SANLIC, which are not at all focused on integrated library systems (ILS) or library automation, which suggests that most LIS professionals are unaware of the importance of consortiums enhancing automation status, as most of the consortiums were discontinued.

5.8 Data Privacy and Security

Table 5-26 below illustrate the outcomes from to options provided to LIS professionals, asked to select a person in charge of data security in their organization. Participants were allowed to choose more than one options applicable to their institutions.

Table 5-26 Data Protection Role Players in Academic Institutions

Role Players	n	%
CTS (Computer and Telecommunication Service Director)	41	32.80%
IT Manager	33	26.40%
Data Protection Officer	22	17.60%
Compliance and Risk Officer	20	16.00%
Other	9	7.20%
Total	**125**	**100%**

The findings shows that 33% selected CTS (Computer and Telecommunication Service Director) as the most popular choice; 33% respondents indicated IT Managers oversee data privacy and security; 26% selected IT Manager while 18% respondents selected Data Protection Officer; 16% selected Compliance and Risk Officer, while 7% who selected other claimed they had no idea who in their organization oversaw data privacy and security. This discovery shows that LIS specialists in South African institutions still lack knowledge and awareness.

5.8.1 Level of organizations general level of data protection awareness

Participants were asked to describe their organization's general level of data protection awareness to provide staff with the knowledge they need to protect your organization's data while performing their duties in accordance with applicable standards, laws, and cyber security best practices. Table 5-27 shows that 43% respondents mentioned that they are aware of information security and cybersecurity in their organizations; In addition, 30% indicated that there are aware of E-mail misuse (email ethics) that is regularly communicated to them by their institutions; 24% indicated that they are aware of use of social media in their institutions; and 3% who selected other mentioned that were unaware of the general level of data protection awareness in their organization.

Table 5-27 Level of Data Protection Awareness in Academic Institutions

Levels of Data Protection Awareness	n	%
Information Security and Cybersecurity staff awareness	72	43.37%
E-mail misuse staff awareness	49	29.52%

Social media staff awareness	40	24.10%
Other	5	3.01%
Total	166	100%

5.8.2 Institutional policies for privacy and data protection

Participants were requested to indicate whether the university provide policies namely: written privacy policy, data protection policy, intellectual property policy, e-mail policy, Internet, and other policies. Participants were required to choose more than one option. According to Figure 5-16, a significant number of respondents 21% selected Privacy Policy, 20% selected Internet Use Policy, 63 (20%) selected Intellectual Property policy, 19% selected E-mail policy, while 18%) selected and selected E-mail. (1%) who indicated other mentioned that that their institutions had already implemented the POPIA (Protection of Personal Information Act).

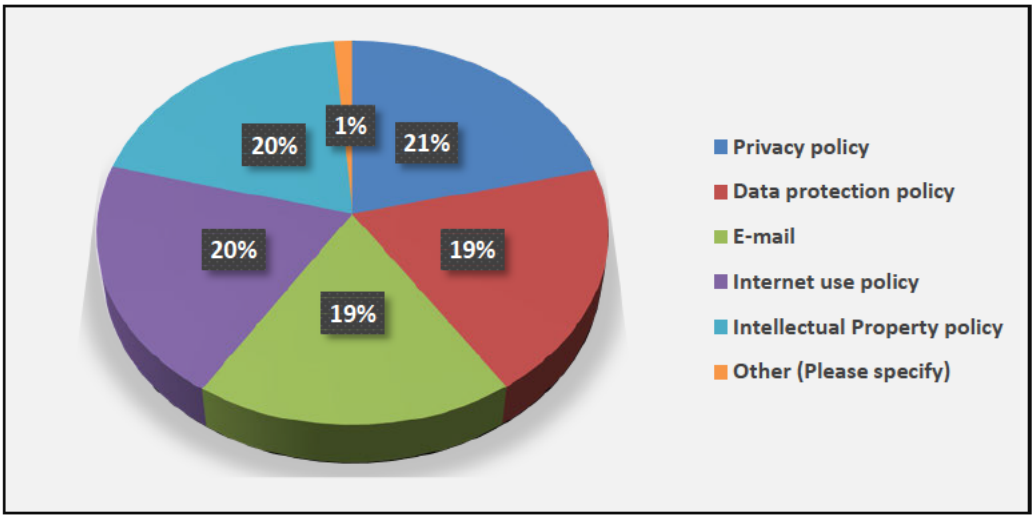

Figure 5-16 Institutional Policies for Privacy and Data Protection

5.8.3 Steps for data and network security

Participants were asked whether their organizations employ systems for data and network security to help LIS professionals maintain data security and compliance. Figure 5-17 shows that a highest percentage 20% said that the best action needed by LIS professionals to maintain data security and compliance is to ”Use a strong, unique password and never share it”; 18% chose “Do not install unapproved software”; 17% selected “Think before opening email attachments”; 16% respondents chose “Shutdown your computer when you leave for a day”;

Lock down your computer when away from your desk during the day, 15% respondents, another 15% of respondents said that their institution's "schedule an antivirus scan for your computer with CTS/IT department" was a better method for ensuring data and network security that they could use to help LIS professionals maintain data security and compliance.

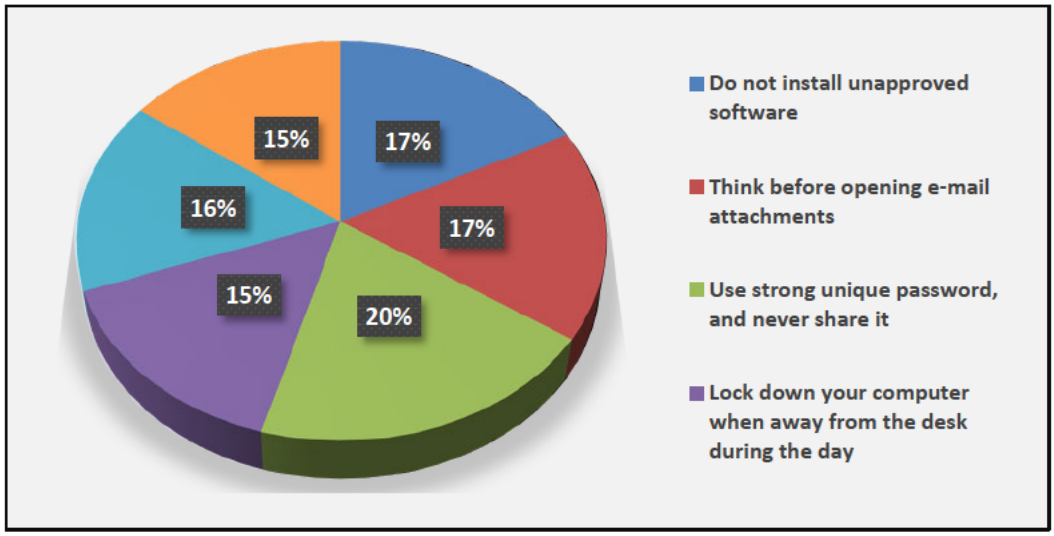

Figure 5-17 Steps for Data and Network Security

5.9 Presentations of findings from the semi-structured interviews with the library directors

This section presents the findings from the data that was collected from LIS directors using semi-structured interviews (Annexure B). The Framework Method is mostly commonly used for the thematic analysis of semi-structured interview transcripts (Chapter 4 Section 4.8). The framework approach enabled the researcher to move back and forth across the data until a coherent account emerges. Each recording and its accompanying field notes were filed on cloud using Otter.ai software and archived for potential retrieval in case of data theft or loss. The transcription of data assisted the researcher with interpretation and building insights. Codes allocated were developed during the coding process, which is inductive coding. In the analysis of transcripts and fieldnotes, an inductive approach was used, allowing the emergence of categories and themes from data and the development of theory. The transcriptions were transferred into MS Word and the raw data exported to excel spreadsheet ready for analysis. The data was analysed using Microsoft Excel 365. Interviews were conducted with 12 LIS Directors out of 26 public universities in South Africa via Microsoft Teams. Findings are

grouped into themes tabulated where possible. Qualitative findings from this instrument were captured in graphs and tables.

5.9.1 Demographic information of the participants

This section presents the biographical information of participants, which involves gender, age, highest organizational qualification, organizational affiliation, department, role in the organization and number of years in the institution. The total number of participants was twelve LIS Directors. This is highlighted in Section B of the questionnaire (Annexure B).

5.9.2 Distribution of gender

Table 5-28 presents the gender of participants.

Table 5-28 Distribution of Gender

Gender	n	%
Female	9	81.8%
Male	3	25.0%
Other	0	0%
Total	**12**	**100.00%**

This item received responses from twelve LIS directors. Table 5-28 show that out of the twelve respondents who took part in the study, nine (82%) are females and three (25%) are males. There were no other sexual orientations besides males and females. None of the 12 survey participants answered the question about sexual inclusivity, even though it was listed as an option under the gender category.

5.9.3 Distribution by age

Table 5-29 presents the distribution by age of participants.

Table 5-29 Distribution of Age

Category	n	%
31–40	2	11.76%
41 – 50	3	17.65%

51 – 60	2	11.76%
60--65	5	29.41%
Prefer not to answer	5	29.41%
Total	**17**	**100.00%**

The age distribution of the participants in the study is shown in Table 5-29 shows that 2 (12%) are between the ages of 31-40, 3 (18%) are within the ages range of 41-50; 2 (12%) are within the age range of 51-60. It is important to note that 5 (29%) are between the ages of 55 and 65. It is interesting to note (29%) preferred not to answer or reveal their age.

5.9.4 Qualification of participants

Table 5-10 Qualifications of Participants

Qualifications	n	%
Master	10	90.9%
PhD	2	9.1%
Total	12	100.00%

Table 5-30 indicates the educational qualification of the study's participants. It shows that a high percentage of LIS Directors 10 (90%) have a master's degree qualification and 2 (9%) of the participants have a PhD qualification.

5.9.5 Organizational affiliations

In this study, 26 public universities in South Africa were selected. Ten out of 26 public universities LIS Directors gave permission and ethical clearance for the semi-structured interview-based data collection. The interviews were attended by just twelve LIS directors from ten (10) public universities. One director (9%) from each of the institutions CUT, DUT, NMU, UCT, UKZN, UL, UNIVEN of WITS participated in the study, along with 3 (27%) from UNISA. Academic libraries in most institution in South Africa consists of an executive/senior directors supported by other directors in strategic positions for example client Services, information resources and distribution/Technical Services and research support and scholarly communication etc. Table 5-31 display the affiliation of the organization.

Table 5-31 Organizational Affiliation

Institution	Directors	%
CUT	1	9.09%
DUT	1	9.09%
NMU	1	9.09%
UCT	1	9.09%
UKZN	1	9.09%
UL	1	9.09%
UNISA	3	27.27%
UNIVEN	1	9.09%
WITS	1	9.09%
NWU	1	9.09%
Total	**12**	**100.00%**

5.9.6 Distribution of role in the organization

Table 5-32 Distribution of Role in the Organization

Roles	n	%
Senior management	10	92.0%
Executive	2	8.0%
Total	**12**	**100.0%**

Table 5-32 and illustrate the role played by the participants in the organization. It is indicated that 92% (option 1) are senior managers, while 8% (option 2) of the participants exercise an executive role in the organization.

5.9.7 Distribution of years of experience

Table 5-33 Distribution of years of experience

Number of years in the organization	n	%
Less than a year	3	25.0%
4 -6 years	4	33.3%
7-10 years	5	41.7%
Total	**12**	**100.00%**

The distribution of participants by how long they have been employed by the organization is shown in Table 5-33 results show that 3 (25%) of the participants have worked for their company for less than a year, 4 (33%) have worked for their organization between four and six years, and 5 (41%) have worked there for between seven and ten years.

5.10 Background Information for LIS Directors

This section covered background information of LIS directors (Annexure B) of the interviews with LIS Directors.

5.10.1 Number of qualified employees

Participants were asked to indicate the number of qualified employees in their libraries. All 12 LIS directors responded to this matter. Table 5-34 below shows the number of qualified and non-qualified employees in academic libraries interviewed.

Table 5-34 Number of qualified and non-qualified employees

University	Professional	Professional (%)	Non-professional	Non-Professional (%)	Total
UKZN	47	61.84%	29	38.16%	76
NWU	65	59.1%	45	40.9%	110
UNISA	106	57.61%	78	42.39%	184
UCT	66	56.90%	50	43.10%	116
DUT	68	52.31%	62	47.69%	130
UL	19	51.35%	18	48.65%	37
NMU	30	50.85%	29	49.15%	59
WITS	15	48.39%	16	51.61%	31
CUT	30	48.4%	32	51.6%	62
UNIVEN	19	43.18%	25	56.82%	44
Total	**465**	**54.77%**	**384**	**45.23%**	**849**

According to Table 5-34, UKZN has a total number of 76 employees with 47 (62%) highest proportion of professional employees, while 29 (38%) are non-professionals. NWU has 110 staff in total, 65 (59%) are professionals and 45 (40%) are non-professionals. UNISA has a total of 184 employees and has the highest staff complement of 106 (58%) professionals and 78 (42%), non-professionals. There are 116 employees overall at UCT , of which 66 (57%) are

professionals and 50 (43%) are non-professionals. DUT employs 130 people in total, of whom 68 (52%) are professionals and 62 (48%) are non-professionals. CUT has 30 (48%) staff in total, 32% are professional and 57% are non-professional. At UL, there are a total of 37 employees, of which 19 (51%) are professionals and 18 (49%) are not. The NMU employs 59 people overall, of whom 30 (51%) are professionals and 29 (49%) are not. There is a total of 44 employees, of which 19 (43%) are professionals and 25 (57%) are not, according to UNIVEN. The WITS has a total of 31 employees, of which 15 (48%) and 16 (52%) are professionals. The total number of professional employees in the ten institutions interviewed was 465 (55%) while unprofessional was 334 (45%), which indicate that more than a half of LIS professionals are qualified to perform in academic institutions in South Africa.

5.10.2 Staff complement

Participants were asked how they thought the composition of staff would change over the next five to ten years. All twelve LIS directors presented their opinions on this subject. They were asked to select YES/NO in response to this interview question. The study shows that 10 (83%) thought the composition of staff will change in the next five years, while 2 (17%) indicated they foresee no change in staff complements.

Four themes were created from all 10 LIS directors who agreed that they will have staffing challenges in the next 5 to 10 years namely: change management (four respondents), staff training (two respondents), staff retention and remote working (two respondents). Table 5-35 below shows key themes created for staff complements.

Table 5-35 Staff Complements

Interview Question: In the next five (5) to ten (10) years, how do you see personnel complements changing?	
Themes	**Responses**
Change management	**Director 1:** *"It is important that staff adapt to change and new technologies." "It is important for senior management to motivate staff to adapt to change and new technologies by reassuring that the disruption of Fourth Industrial Revolution and arrival of new technologies will not put their current jobs at risk"* **Director 6:** *"The changing traditional role of the library in rendering service like cataloguing are currently changing and replaced by new roles like metadata librarians to be in line of the current trends of the library academic environment".* **Director 7:** *"I do foresee a lot of changes, even job descriptions in library functions." Traditionally, we used to have roles like cataloguers but now we have metadata librarians, digital literacy librarians or data curators because now library are being digitized. "The past two year has brought a lot of change in terms the way libraries are quality service to better service their clients in line with the current trends and evolving technologies.* **Director 11:** *"There will be a shift towards IT support, digitisation services, e-resources management, and open scholarship support due to the disruption of the fourth industrial revolution."*
Staff retention	**Director 4:** *In terms of IT qualifications and technical, we do not have a sufficient qualified staff in the IT department. "Staff studying PhD's and master's degree are studying towards the library science qualifications but are looking at moving to academic in the library science department."* **Director 6:** "*Most of our staff members are nearing the retirement age soon . I see a lot of younger generation filling in those position. coming in. We are losing a lot of professional staff in different expertise areas and those positions are vacant."*
Staff training	**Director 1:** *Staff need to upskill themselves with IT and technical skills and keep themselves updated with the disruptive technologies like the Fourth Industrial Revolution."* **Director 3** *"I see more staff members getting their professional qualifications because most of them are studying towards library science and advancing to Master and Doctoral levels."*

Interview Question: In the next five (5) to ten (10) years, how do you see personnel complements changing?	
Themes	**Responses**
Remote working	**Director 7:** *"As the university we had quite a shift in offering traditional resources to digital resources where a hybrid approach."* **Director 8:** *"Areas that are becoming redundant such as circulation services because of declining loans of library materials. In the past we use to have a huge compliment of the staff because of the emergence fast growing of online resources their tasks are becoming redundant" . Therefore, staff need to be redeployed in other areas to their new roles in response to the current technological trends for example web services, teaching and learning Services.*

5.10.3 Obstacles (IT function) in adoption and maintenance of the next generation ILS

LIS directors revealed significant problems in the adoption and maintenance of the next generation ILS. Five (41%) of LIS directors considered training and development, four (4) 33% considered working remotely, three (3) 25% considered change management, 2 (16%) selected staff involvement, one (8%) staff retention and top-level management support. Figure 5-28 shows themes and responses regarding significant problems in the adoption and maintenance of the next generation ILS.

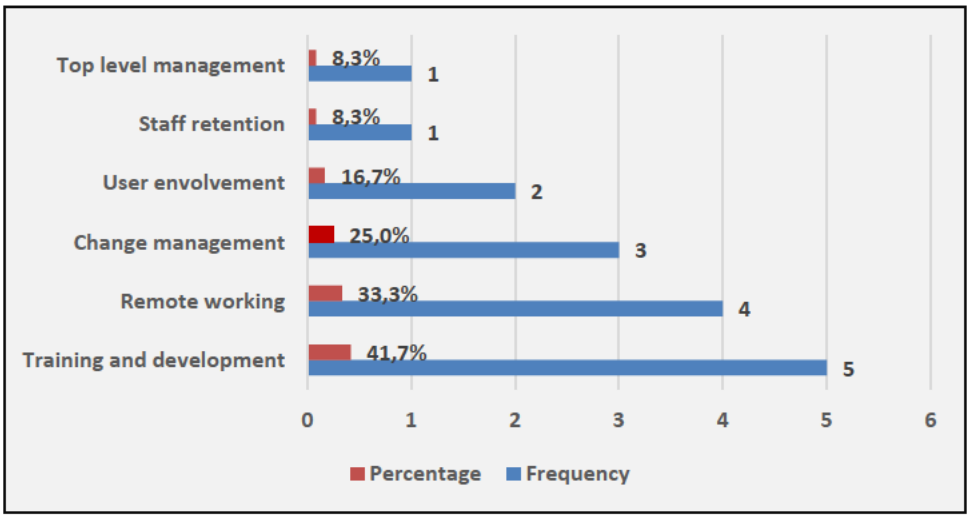

Figure 5-18 Obstacles IT Function Faced by Libraries

Figure 5-19 shows key themes and responses emanating from significant problems in the adoption and maintenance of the Next generation ILS.

Table 5-36 Obstacles in IT Functionality

Interview Question: What are the most significant obstacles (IT function) you and your professional personnel face when serving your clients?	
Themes	**Responses**
Training and development	**Director1:** *"Library staff are professional staff with qualifications, and some are acquiring their new qualifications" . "I am doing my PhD with an international university to further my study and I have accumulated IT and technical skills during the early stages of my career ".* **Director 6:** *"We have a Professional Development Plan (PDP) to identify the necessary skills and resources to support the staff member's career goals and the organization's business needs. When introducing a new service or system we ensure that we sent staff for training."* **Director 7:** *"I was expecting than information or user services staff people would to be more technology savvy the other library staff in the libraries because they have been working on this kind of queries for years" .* **Director 8:** *"There is lack of training and skills and lack of awareness and mind shift from traditional to online staff."* **Director 10:** **"** *There is a need of skills development in the IT function area for LIS professionals in libraries." "We need system developers to develop our systems which is a major challenge library are facing."*

Interview Question: What are the most significant obstacles (IT function) you and your professional personnel face when serving your clients?	
Themes	**Responses**
Remote working	**Director 2:** *"Creating students' spaces in the university, whether the environment is virtual or physical environment, there be support 24hrs if there is any problems or technologies to support or become more visible to students"* **Director 6:** *"We recently moved to a new system called Moodle which is Moodle is used for blended learning, distance education, flipped classroom and other online learning schemes in schools, universities, workplaces, and other sectors."* **Director 7:** **"***They were lot of queries and related queries when staff deal with in the virtual space when they deal with users. Things like authentication and connecting from home to how guide library users. Issues like IP addresses and even things like web errors and those technical methods what happened in our environment"* . **Director 11:** **"***Our challenge is User access to suitable technology for learning; access to data for remote work; up to date skills to support multiple types of devices; low computer literacy skills of users***."**
Change management	**Director 1:** "*You will expect the new generation of staff members to come on board, but they are reluctant to change*". "*Robotics and IA (Artificial Intelligence) technologies to respond to the development of the Fourth Industrial Revolution (4th IR) staff were introduced more than 5 years, but they have not yet been adopted by most academic libraries".* **Director 6:** "*We need to ensure that current staff are well trained in line with the current trends of academic libraries*". **Director 8:** **"***There is general fear in the adoption new technologies***." "***We need to apply change management as library management to educate our staff that environment is changing and to create awareness to our staff members and to our users that things are shifting the landscape has changed in the library environment."*

Interview Question: What are the most significant obstacles (IT function) you and your professional personnel face when serving your clients?	
Themes	**Responses**
User involvement	**Director 2:** **"***It is important creating guides and training aids for students to assist them in understanding library services*." **Director 5:** "*The institutional IT has lack of understanding of the library system and environment and it takes them a long time from the institutional side to support because of their lack of understanding of library systems and platforms." "This result to IT problems not fixed on time they understand it, it has affected our clients negatively."*
Staff retention	**Director 9:** *"Understanding library system is quite a challenge and attracting qualified system librarians or IT people in the library difficult in most libraries. In some instances, libraries hire people without library qualification, targeting on those IT skills." If the person resigns is difficult to replace and there is no succession plan to fill those positions ".*
Top level management support	**Director 1:** "*Staff are reluctant to explore this new technology although there was a buy in from senior management and university".*

5.10.4 Library IT support staff to support and execute library IT mandate

Respondents were asked to indicate in (YES/NO) if their libraries have enough staff to carry out the mandated IT function. This item received responses only from 11 out of 12 LIS directors. The study shows that 4 (36%) of the participants checked the "YES" box, while 7 (64%) selected the "NO" option.

During interviews, a participants responded "NO", prompting explanations for decisions. Figure 5-19 and Table 5-37 illustrates the frequency and percentages of the generated themes. The primary reason for the staffing shortage in library IT departments, according to a sizable portion of 7 (58%) respondents, is a lack of IT training and expertise. In response to the disruption of technology and changing environment of learning, teaching, and research, five respondents (41%) stated that their libraries are going through processes restructuring in their

libraries. Two respondents (14%) indicate that remote working add advantage for libraries to fulfil their IT mandate.

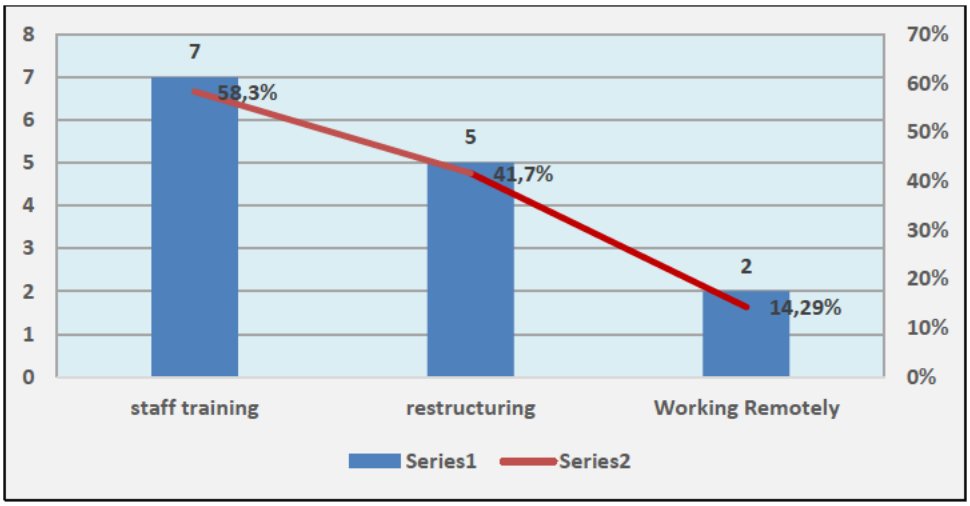

Figure 5-19 Library IT Support

Three themes were identified as reasons whether libraries have sufficient staff to execute the IT mandated, namely: staff training, library restructuring and remote working (Table 5-37).

Table 5-37 Themes Library Staff IT Support

Interview Question: Does your department have sufficient staff to execute the IT function library mandate?	
Themes	**Responses**
Staff training	**Director 4:** *"As I have mentioned in the previous question, we don't have sufficient library IT staff to deliver the IT mandate within the university due to lack of training in IT and technical skills, but we have sufficient IT support from university ICT to cover up for this role."* **Director 5:** *"The most challenging part is the is the computer programming. When we face challenges in the library, we do not have sufficient IT staff and we must ask assistance from institutional IT department with library IT issues and problems."*

Interview Question: Does your department have sufficient staff to execute the IT function library mandate?	
Themes	**Responses**
Library restructuring	**Director 2:** *"The institution used to be an IT unit within the libraries and that was dis established when the business process review happened a few years ago that was in 2016 -2017". "With the new process the IT function was centralized and so now we have a login system that are logged and the assigned to IT personnel. We have a small unit in the library focuses on other IT functions for example the replacement of hardware and computer upgrades etc. in the library."* **Director 7:** **"***Previously we used to have a deputy director for IT, but which became vacant in 2016 it was never replaced and became stagnant because of restructuring. So, the physical technical network IT support we rely on ICT for those functions. There are no service level agreements in place between life the library and ICT."*
Remote working	**Director 12** **"***The impact of COVID-19 19 and lockdown period prompted us to assist client remotely and the required library management to support staff with restructuring library finances, by ensuring that staff have adequate resources to work remotely from home which was a major challenge as we have not budgeted for staff resources working from home buying laptops to all librarians***".**

5.11 Technological Impact of the Next generation ILS in Academic Libraries

This section sought the responses of technological impact of the next generation ILS under Section D of LIS directors' interviews (Annexure B), the main aim on the nature and extent to the adoption and maintenance of the next generation ILS in libraries.

5.11.1 Types of the next generation integrated library systems (ILS)

Respondents were given a list from which to select the next generation ILS that they are currently using in their libraries. They were required to select one of the options provided to indicate the next generation ILS they are currently using; if not options were provided to indicate the other type of systems, they use in their libraries was included. This item received

responses from all 12 LIS Directors. Figure 5-20 shows the summary of the next-generation Integrated Library System(s) (ILS's) currently used by LIS Directors.

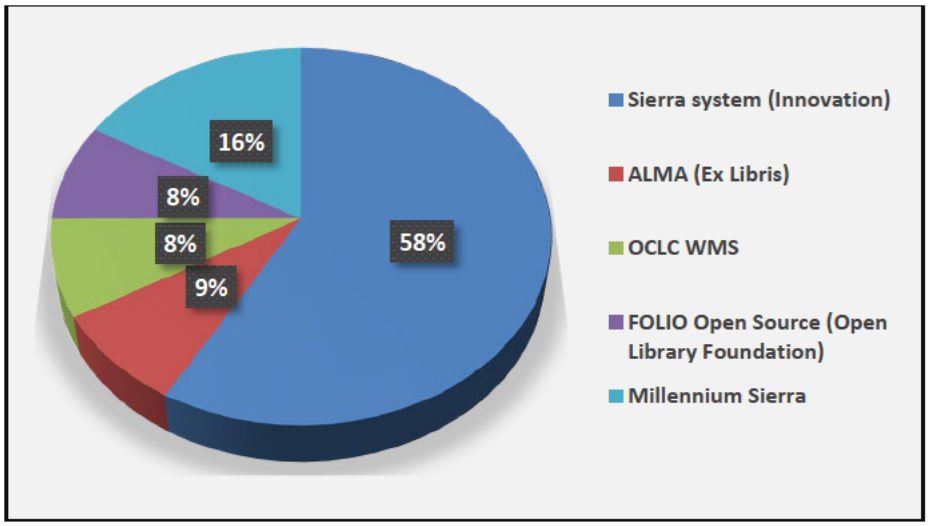

Figure 5-20 Types of Next Generation ILS Currently Used by LIS Professionals

More than half of LIS directors, 7 (58%), said Sierra system (Innovation) is their current cloud-based next generation ILS in their libraries. One (8%) of the other LIS directors said they used ALMA (Ex Libris), WMS (World Share Management System) by OCLC (Online Computer Library Centre), and Folio Open Source (Open Library Foundation). Even though they were given the option of indicating their previous traditional ILS used prior to the next generation ILS, 2 out of 12 (16%) LIS directors chose to answer this question by stating that they are still using the traditional server-based Millennium Sierra system and have not yet migrated to the cloud-based next generation ILS.

5.11.2 Traditional ILS, previously used by LIS directors prior to the adoption of the next generation ILS

Prior to the adoption of the new generation ILS in their libraries, interview questions required LIS directors to list the traditional ILS they had previously used. Responses to this item came from all 12 LIS directors. LIS directors utilized traditional ILS prior to the adoption of next generation adoption Figure 5-21.

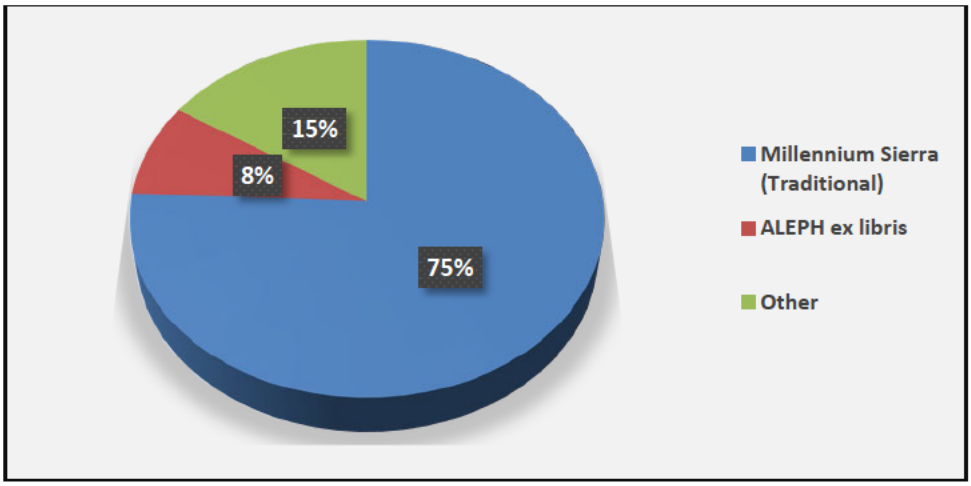

Figure 5-21 Traditional ILS Previously Used by LIS Directors

Traditional Millennium Sierra System 9 (75%) prior to migration to the next generation ILS was the most preferred system used by LIS directors. Of the other LIS directors, one in (8%) said they used ALEPH. The other two (15%) LIS directors who selected other said that before migrating to the new ILS, they had previously used traditional ILS such as Symphony and Sirsi Dynix.

5.11.3 Technological Factors considered by LIS directors before adopting the next generation ILS

Participants were asked to indicate which factors they considered by their libraries before adopting the next generation ILS. Figure 5-32 shows the technological factors to be considered before adopting the next generation ILS. The researcher asked participants to list determining factors, relevant prior to the adoption of the next generation integrated library system. Responses included technological items, organizational aspects, and librarians' perceptions.

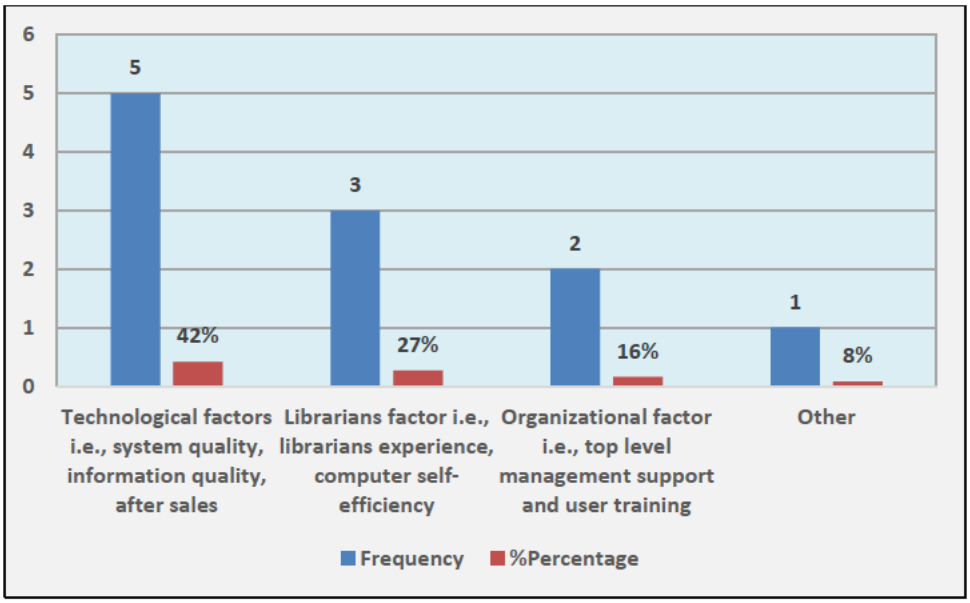

Figure 5-22 Technological Factors to be Considered When Adopting Next Generation ILSs

The interview protocol requested that participants mark the most cited factors when adopting next generation ILSs . The following feedback emerged: technological factors such as system quality, after sales, information quality (41%); librarians' factors (26%) cited by LIS directors including librarian experience, computer self-efficiency; and organizational factors (16%) such as top-level management support and user training) – the lowest factor offered by LIS professionals. Additional factors considered by LIS directors was data security (8%) comprising data privacy and security.

5.11.4 User training qualities considered before adoption of next generation ILS

Participants were asked to indicate user training qualities as a training factor before considering the adoption of next generation ILS in their libraries. Director LIS from twelve libraries responded to this item. Four (4) themes on user training qualities were identified: trainers' personnel Skills and competence (67%), user commitment (25%), and 8% training curriculum, and computer self-efficiency (17%). Figure 5-23 shows themes created.

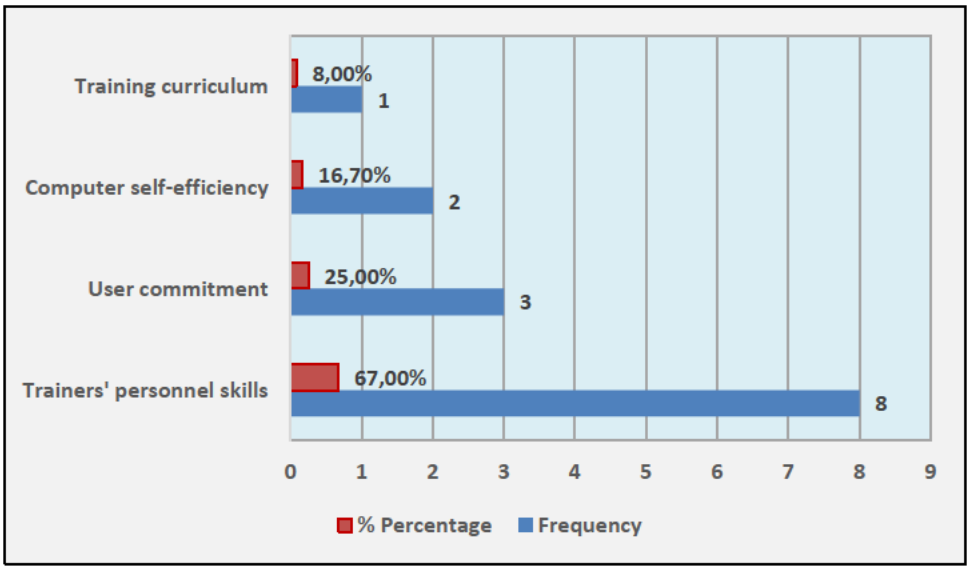

Figure 5-23 User Training Qualities Considered Before Adoption of Next Generation ILS

Table 5-38 presents responses from LIS directors.

Table 5-38 User Training Qualities Considered

Interview Question: What user training qualities were considered when considering user-training as a factor for the adoption of next generation ILS?	
Themes	**Responses**
User Commitment requirements	**Director 4:** "*User commitment in terms of acquiring new skills and understanding the library platforms and increasing their knowledge and experience in their search capabilities.*" **Director 6:** "*We looked at the user commitment by accessing the end users' needs and demands.* **Director 11:** "*We look if the system was Ease of use, minimum training required, training was done on different levels, depending on the functional areas.*"
Training Curriculum	"*We looked at the training curriculum, because our student population changes to their first year and then until they finish.*" "*We do train on a continual basis terms of information literacy, on all the levels of students and experience under the curriculum and credits.*"

Interview Question: What user training qualities were considered when considering user-training as a factor for the adoption of next generation ILS?	
Themes	**Responses**
Computer and self-efficiency	**Director 1** *"We look at training skills and competence in giving priority to the user services staff members are training in the new system because they are the front-line service desk that deal with the students queries."* *"LIS professionals be trained on specific functions on the system that is aligned with their specific job requirements, tasks, processes, and workflows."* **Director 6:** *"We always looked on the current trends in academic libraries and in the library and information sector to proactively offer new serves to our clients before they even request that service in the library."*

5.11.5 Steps in the implementation of a newly purchased system

The LIS director was asked to provide a list of the critical steps that must be followed before a recently purchased system or piece of software can be used. There were twelve responses to this question. The frequency of themes gathered from LIS directors' responses as shown in Figure 5-24 are budget requirements 66% (8 responses), system integration received 58% (7 responses), vendor support and collaboration 25% (3 responses each), project management 16% (2 responses), and data security received and change management 8% (1 response).

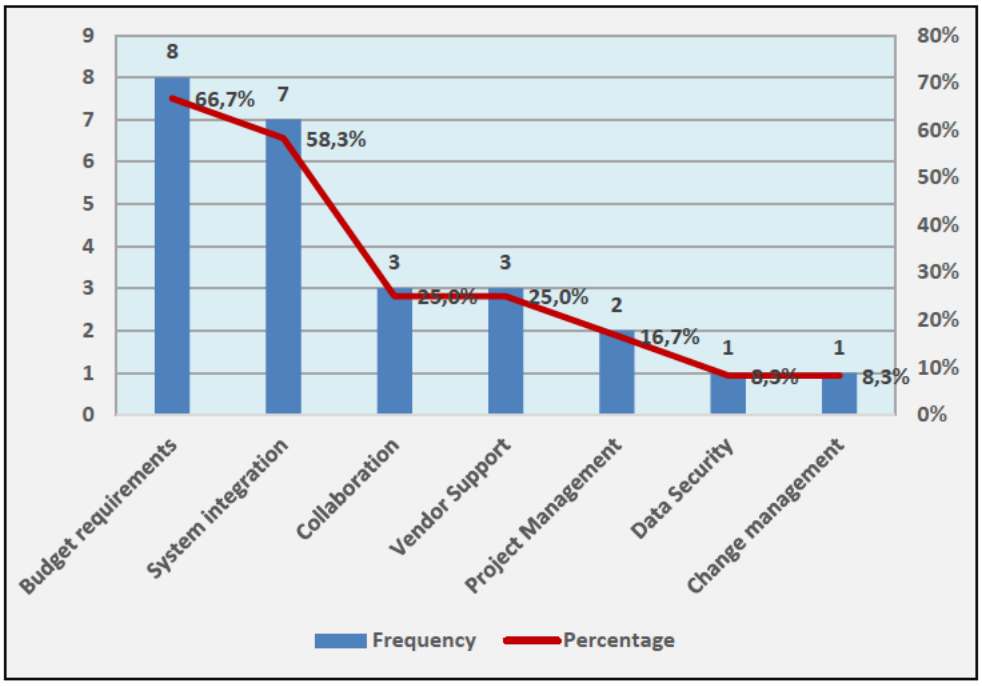

Figure 5-24 Steps in the Implementation of a Newly Purchased System

Seven themes: data security, project management, vendor support, collaboration, system integration, and budgetary needs were identified as themes as shown in Table 5-39

Table 5-39 Responses Steps in the Implementation of a Newly Purchased System

Interview Question: Purchasing a new software system is a great step in the right direction for your library business requirements. What critical steps does your library need to take for an implementation of newly purchased software or system?	
Themes	**Responses**
Budget	**Director 1:** **"***We conducted the audit new software to identify user requirements and budgetary requirements for a new system."* **Director 2:** **"***In our institution we are connected to our financial system SAP system***".** **Director 5:** **"***We have a team of people that do the analysis is in terms of the cost of the system in the market and what is available to meet the library and user's needs.***"** **Director 6:** *"We do receive sufficient financial resources for IT and system and software packages."* **Director 7:** *" We need budget and the funds to maintain your system."* **Director 9:** "*Another critical step is the cost and affordability of the system.*" **Director 10:** **"***Determine the budget requirements for this so that as you go into it, you have sufficient money to get a system because the market is increasingly becoming competitive , you want to get the best out there you must consider the tendering processes themselves in terms of procurement because the systems are expensive.* **Director 11:** **"***We looked at the Budgeting needs to be in line with strategy***."**

Interview Question: Purchasing a new software system is a great step in the right direction for your library business requirements. What critical steps does your library need to take for an implementation of newly purchased software or system?	
Themes	**Responses**
System integration requirements	**Director 2:** **"***There are different systems and platforms on universities, systems integration with these platforms is important."* **Director 4:** **"***We look at the alignment with the library strategy and whether it can integrate with other library services platforms. The integration with other system and platforms in the university and support from ICT***."** **Director 5:** *"software's that are available the library integrated systems that are available in the market."* **Director 6:** **"***The integration with other system and platforms in the university and support from ICT***"** **Director 7:** *"You should look at the system that can streamline workflow and minimize task to be automated in the new system."* **Director 8:** **"***we need to look at the compatibility of the system, the hardware and software and the testing of the system before implementation."* **Director 9:** *"The most important step in evaluating the system is looking at what we need to use the system for and then assessing the system to determine whether it will be able to meet our organization objectives and what we want to achieve in the system"* .

Interview Question: Purchasing a new software system is a great step in the right direction for your library business requirements. What critical steps does your library need to take for an implementation of newly purchased software or system?	
Themes	**Responses**
Collaboration	**Director 1:** **"***The institutional ICT department is involved in managing the system for any university, but that function is managed externally."* **Director 8:** **"***The involvement of all the stakeholders and all the members that must testify just number two, in that process, must be actively involvement of all stakeholders or project team need a clear scope and definition of the role that the need to undertake on the process."* **Director 9:** *"Involving and having a series of meetings with our IT Directorate, because of their role and critical support part o in term of access and use of the system, network support, and advise in evaluating is going and buying software and systems and other IT tools which will work well in our network environment***" .**
Project Management	**Director 3:** *"We are in the process of doing an exercise called Project renewal, which is just looking at all its operations to see where enhancements can be made, so that all operations are optimally used and so that we enhance our efficiencies."* **Director 8:** **"***All the stakeholders need to be involved in terms of the initial planning of the project itself so that when it comes to the implementation or execution of the plan need to be clear items including clear milestones that they need to evaluate in the process***" .**
Vendor support	**Director 7:** **"***Vendor support must be considered, and support 24 hours must be considered". "You work on the circulation system and there is error in the system the systems library cannot run a report and trace who committed an error, but you will have to pay the vendor to compile that report.* **Director 10:** **"***The kind of training program that your vendor has to offer"* **Director 12:** *"Knowing and understanding the vendor in terms of their business for the past few years and the achievements".*

Interview Question: Purchasing a new software system is a great step in the right direction for your library business requirements. What critical steps does your library need to take for an implementation of newly purchased software or system?	
Themes	**Responses**
Change management	**Director 3:** *"Some of our staff are not ready for that kind of change because system changes a big change for library staff and carries with it a certain level of anxiety"*
Data security	***Director 7:*** *"Data security, data recovery and the data migration".*

5.11.6 Significant problems with the adoption of next-generation ILS

The researcher asked participants if they had encountered any significant problems or challenges when implementing a next-generation ILS in their library. To this item, all twelve directors provided feedback. Most respondents, eight (67%), answered affirmatively, and seven (33%) said they had not run into any issues.

Respondent questioning further delved into the possibility any problems experienced with libraries adopting next-generation ILS. The eight people who answered "yes" to the previous questions explained their affirmative choices. The interviewees for LIS directors listed a variety of difficulties with implementing and maintaining the next-generation ILS. Figure 5-28 displays the frequency of the themes derived from the responses of LIS directors: Most responses 58% (7 responses) experienced problems during system integration. Budget, staff involvement, and training were frequently cited (16%) (2 responses each); and data security, support from top management, and vendor support received the least mentions (8%, 1 response each).

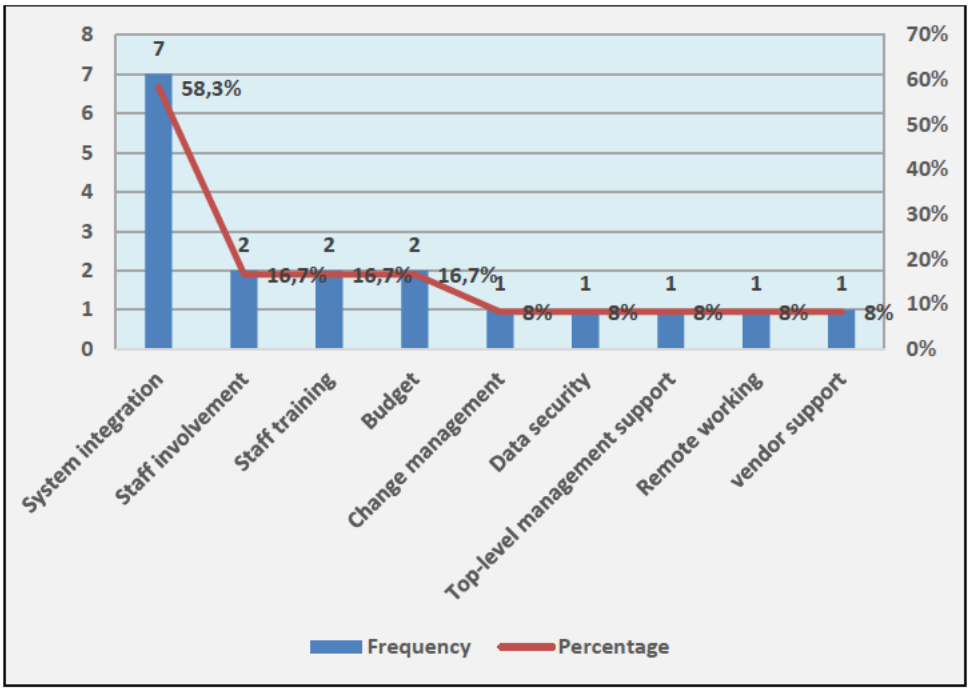

Figure 5-25 Problems in the adoption of next generation ILS

Challenges included the lack of system integration, vendor support, staff involvement, budget, change management, awareness on data security, top-level management support and remote working. Themes and responses were created as depicted on the significant problems in the adoption of next generation ILS in Table 5-40.

Table 5-40 Significant Problems in the Adoption of Next Generation ILS

Interview Question: Have you ever noticed a significant problems/challenges in the adoption of next-generation ILS in your library?	
Themes	**Responses**
System integration	***Director 1*** *"Challenges of migrating to the new system." "Integration of the self-check unit into Sierra because it was cloud based and did not meet the software requirements of the system."* ***Director 5:*** *"The hindrances that you have on your institutional server or firewall the service providers might not have known them and then it takes a longer time to resolve those issues."* ***Director 6:*** *"We looked if the new system would integrate with other functions and to streamline workflows in the library."* ***Director 7:*** *"We encountered challenges regarding failed system updates."* ***Director 8:*** *"During the migration to the new system, we lost a lot of data because of failed updates of the system." "During the migration to the new system, we lost a lot of data because of failed updates of the system."* ***Director 10:*** *"We reviewed at the contract ad service level agreements that the deliver what is required from the system because experience from the previous system for negotiation and migration itself.* ***Director 11:*** *" FOLIO is an open-source system, so development is ongoing to integrate with other platforms."* *and require users to change and update their passwords.*
Staff involvement	**Director 3:** *"Communication with all staff".* **Director 5:** *"Staff have attitude if they are not involved in the decision of purchasing a system"*

Interview Question: Have you ever noticed a significant problems/challenges in the adoption of next-generation ILS in your library?	
Themes	**Responses**
Staff training	**Director 1:** *" It was the functionality of the system because everything has changed, the interface is changed, etc. So, although staff received training."* **Director 3:** *"Proper training was provided to all staff . I think what we liked, and training was arranged for staff and discussed with the service provider*
Budget	**Director 1:** *"Lack of budget and receiving funding* ***from the university" .*** **Director 6** *"We look at the system, how much it cost and how will we benefiting from it when we purchase it and whether it cater for our services better to render an efficient service to our clients."*
Change management	**Director 3:** *"Staff anxiety with regards to change." "What should have happened was to have change management workshop.*
Data security	**Director 11:** **"***The biggest challenge been on cloud is concerned about the system or data security."*
Top-level management support	**Director 7:** *"The senior executive team felt that if something goes wrong, then what it means is access to the resources that they need will not be available."*
Vendor support	**Director 10:** *"We negotiated the extension from the vendors to ensure the system migration runs smooth."*
Remote working	**Director 12:** *"Being in the cloud sometimes require staff load share of desktop application computer their computer to take control with their trouble shooting while working from home and each every now and the IP address need to be changed*

5.11.7 Failures in the implementation of next-generation ILS

To reduce failures when implementing a next-generation ILS in their libraries, LIS directors were asked for their suggestions for improvement. Eight major themes emerged from the responses, including vendor support (50%) (6 responses), project management (41%) (5 responses), system integration and change management (33% each), interdepartmental

communication (16%) (2 responses), and top-level management involvement, collaboration, and training one (8% responses each). The summary of the number of themes and responses created is shown in Figure 5-29.

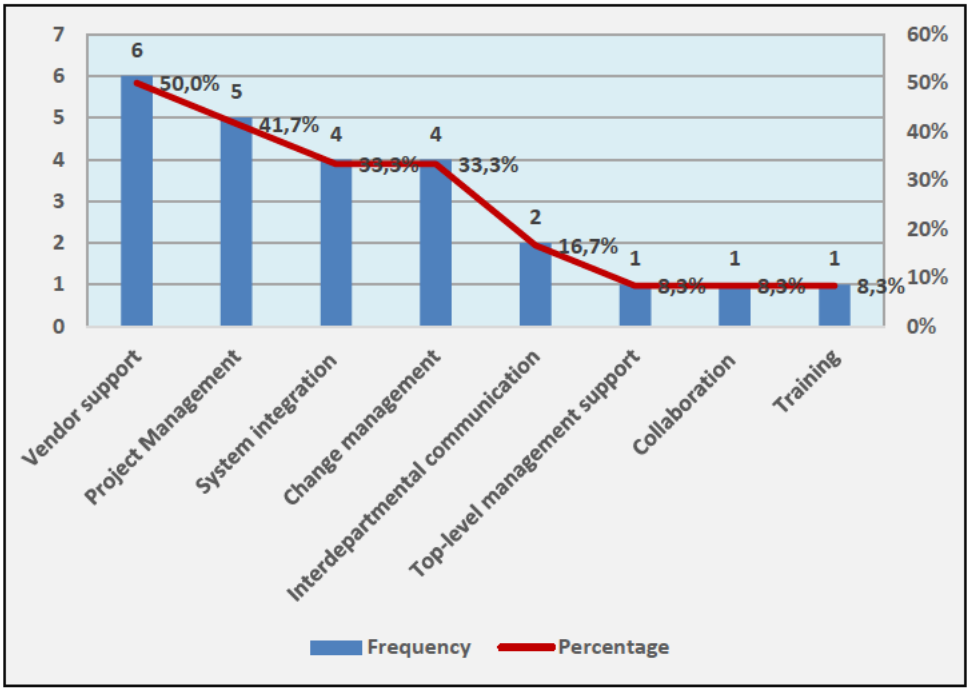

Figure 5-26 Failures in the Implementation of Next Generation ILS

Table 5-41 shows LIS directors' responses and themes created regarding how they can reduce failures in future implementation of the next generation ILS.

Table 5-41 Themes Reducing Failures in the Implementation of Next Generation ILS

Interview Question: How can we reduce failures in the implementation of next-generation ILS in your library?	
Themes	**Responses**
Vendor support	**Director 1:** *"Hold regular meetings with the vendor or service provider basically to ensure that the system is implemented effectively, and that the system functionality are working effectively before migration."* **Director 2:** *"Vendor support is crucial. It is important to understand the service level agreements with the supplier for support and maintenance of the system before implementation."* **Director 5:** "*The failures that we can reduce are the vendor support because we phase challenges when implementing a news system especially during migration*". **Director 6:** *"Vendor support and staff user involvement are failures that we can reduce before implementing the system."* **Director 10:** **"***And then when you select your vendor, you need to really enter into watertight agreements with the vendor so that they deliver on what we're expecting. That you know, the vendors will promise and so the service level agreement and the Memorandum of Understanding***.** **Director 12** *"The biggest challenge that we experience was the vendor support 24hrs and especially that the system is hosted on cloud in the different country***".** *"Service Level Agreement must clearly outline and that the Vendors should deliver what they promised."*

Interview Question: How can we reduce failures in the implementation of next-generation ILS in your library?	
Themes	**Responses**
Project management approach	**Director 4:** **"***To apply change management across all the libraries and involve all the stakeholders in the project***."** **Director 5:** "*Implemented systems needs a holistic approach where everybody would have had an opportunity to get involved the team responsible for implementation a would have the sufficient time to manage the expectations of the people that attend the different users*." **Director 6:** "*We need a project team including technical expertise all that will evaluate the system and look at the specification of the system to see of the all the specification of the system are met*." **Director 10:** "*From the beginning of the project, you must clearly articulate your specifications*" . **Director 12:** *"Project must plan properly, and all stakeholders involve."*
System integration	**Director 5:** *"When phasing out the old system and migrating to the new system the data can be lost along the way".* **Director 6:** **"***We need to have smart ICT staff who can assist us with that, that they can critically evaluate the system before implementation.'* **Director 8:** *"It is important for libraries to know how to evaluate the system and to benchmark and select systems that are best suited for their organization."* **Director 11:** "By giving More time for investigations, more time dedicated to configuration and migration."

Interview Question: How can we reduce failures in the implementation of next-generation ILS in your library?	
Themes	**Responses**
Change management	**Director 3:** *"There was anxiety because any change will bring with it a level of anxiety because we communicated properly with all staff before the implementation took place."* **Director 4:** **"**Staff have a fear in adapting to new technology and need support form Senior management to cope with emerging technologies**."** **Director 7:** *"It is important for the library to align itself with the current technological trends in academic libraries in terms of library automation***". "**I*t is important to adapt to change and understand the shift of traditional resources to online resource and understand the current landscape in academic and higher education environment".*
Interdepartmental communication	**Director 1:** *"I think interdepartmental communication is important, staff responsible for system implementation need to have meetings and communicate and involve all the stakeholders for collaboration" .* **Director 3:** *"Interdepartmental communication is important. We can reduce the failures by number one, proper planning. Number two, by adequate consultation with all stakeholders before the implementation takes place, because it's important that we take people along with you ".*
Collaboration	**Director 9:** *"From my experience with this system specifically the lack of technical knowledge is a great challenge and that is why we constantly need to collaborate and get support from IT support in the implementation process to reduce failures."*
Top-level management involvement	**Director 4:** *"I think failures that we can reduce is staff user involvement and top-level management involvement"*
Theme 10: Staff training	**Director 9:** *"Yes, we encountered challenges and I think the important one would be adequate training for staff, in collaboration with the IT Directorate that in providing technical support."*

5.11.8 Shift from traditional ILS to a next generation integrated (ILS) library system

The LIS directors were asked to indicate what assistance they could provide to someone who needs to switch from a traditional library integrated system (ILS) to a next generation integrated (ILS) library system to meet the service delivery goals of Library 4.0. This item received responses from all twelve LIS directors. Figure 5-30 illustrates the responses that reveal the issues that need to be considered: change management, which received 50% (6 responses), system evaluation 25% (3 responses), system integration, data security, budget, and staff involvement, each receiving 16% (2 responses each) were training curriculum, and top-level management involvement. Top level management and training curriculum received 8%.

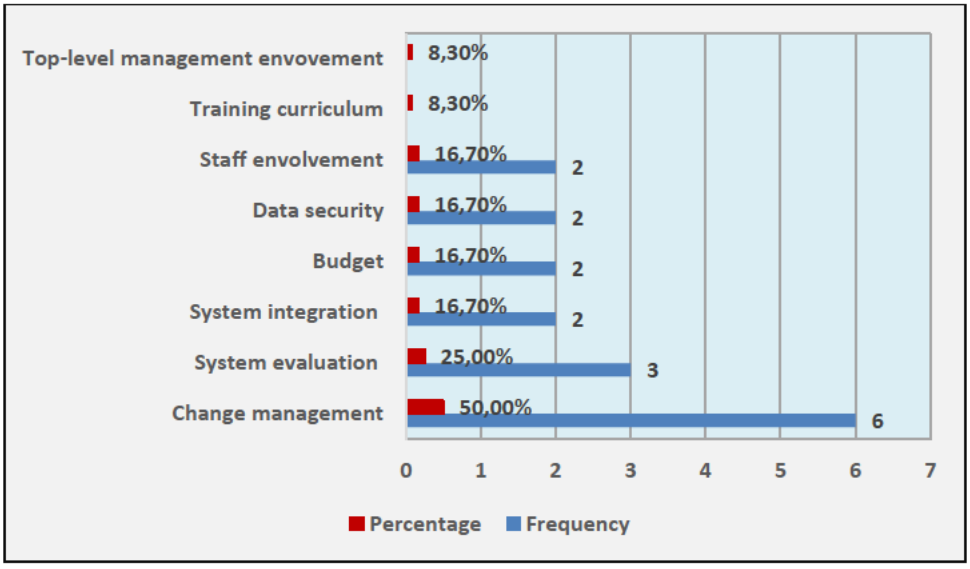

Figure 5-27 Shift from traditional ILS to next generation ILS

Table 5-47 shows LIS directors' responses and themes created on how LIS directors can reduce failures in future implementation of the next generation ILS.

Table 5-43 Themes Shift from traditional ILS to next generation ILS

Interview Question: What advice do you have for someone who needs to make the shift from the traditional library integrated system (ILS) to a next generation integrated (ILS) library system to meet Library 4.0 goals in service delivery?	
Themes	**Responses**
Change management	**Director 1:** **"***The library needs to move with the needs of the young generation and new trends including the Fourth industrial revolution, otherwise the library will be stagnant and not move forward."* **Director 4:** **"***It is important to look at the latest trends in academic libraries and their evolving systems and technologies*." **Director 5:** "*It is extremely critical to have internal conversations and involve all the stake holders. This makes it easier for staff to easily adopt new system and allows staff and management to change easier*." **Director 6** *"Moving to the cloud is a very challenging step, it is important for staff to have an understanding and the benefits of moving to the cloud-based systems in line with the current technological trends."* **Director: 8** *"It is important to adapt to change and understand the shift of traditional resources to online resources and understand the current landscape in academic and higher education environment".* **Director 12:** "*The advice I will advise is applying change management techniques and keep staff motivated to adopt to the new technology and understanding the trends in the technological environment of academic institution*."
System evaluation	**Director 3:** *"It is important to evaluate systems in the market from different service providers in the market. It is important that each service providers provide a demo on the systems or products and for staff to get involved in the demonstrations and presentations of new product."* **Director 8:** *"It is important for libraries to know how to evaluate the system and to benchmark and select systems that are best suited for their organization."*

Interview Question: What advice do you have for someone who needs to make the shift from the traditional library integrated system (ILS) to a next generation integrated (ILS) library system to meet Library 4.0 goals in service delivery?	
Themes	**Responses**
System integration	**Director 2"** *"new infrastructure required and support the system function".* **Director 4:** *"It is important to look at institutional technological infrastructure and environment and to ensure that the institutional ICT is involved in the purchasing of news system and its capability to integrate with other platforms within the university".*
Budget	**Director 10:** *"We must look at the value of money and have a realistic budget of the system. The system cost you to get into your system before you sign an agreement and together with that, your clear definition of expectations."* **Director 11:** *"Should be driven by library and institutional strategy, be sustainable with long term sustainability and short-term costs for long term gains."*
Data Security	**Director 2:** "*Library must have strong collaborative agreement with the university's ICT division so that in terms of data security."* **Director 6:** *".Staff are uncertain about security and privacy on access to information and awareness and training need to be done for staff to embrace new technologies."*
Staff involvement	**Director 2:** *"It is important to involve staff in the evaluation of systems because they are expertise in their different roles on the system. It is important to decide to choose the system that best suits your organization*." **Director 5:** *"I think more than anything, it's critical to have the internal conversations and keep staff involved before purchasing the system."*
Training curriculum	**Director 1:** *"We must look at the training curriculum and look at what's happening in our schools' curricula to include Fourth Industrial Revolution technology skills from schools e.g., coding when they come to the tertiary education that the meet the skills and requirement for new enrolments criteria" .*

Interview Question: What advice do you have for someone who needs to make the shift from the traditional library integrated system (ILS) to a next generation integrated (ILS) library system to meet Library 4.0 goals in service delivery?	
Themes	**Responses**
Top-level management evolvement	**Director 5:** *"The support and buy in from executive management are important. It is critical to have internal conversations and involve all the stake holders."*

5.11.9 Library 4.0 service delivery

The question of how their institution, from an executive management perspective, can assist their libraries in successfully offering Library 4.0 services was presented to the LIS directors. To this item, all LIS directors provided feedback. The two key issues are budgetary considerations, which are represented by 50% (2 responses each) in Figure 5-48, and strategic alignment, which is represented by 33% of (4 responses). Change management, system integration, and training 16% (2 responses each), while top-level management and system evaluation received less attention 8% (1 response).

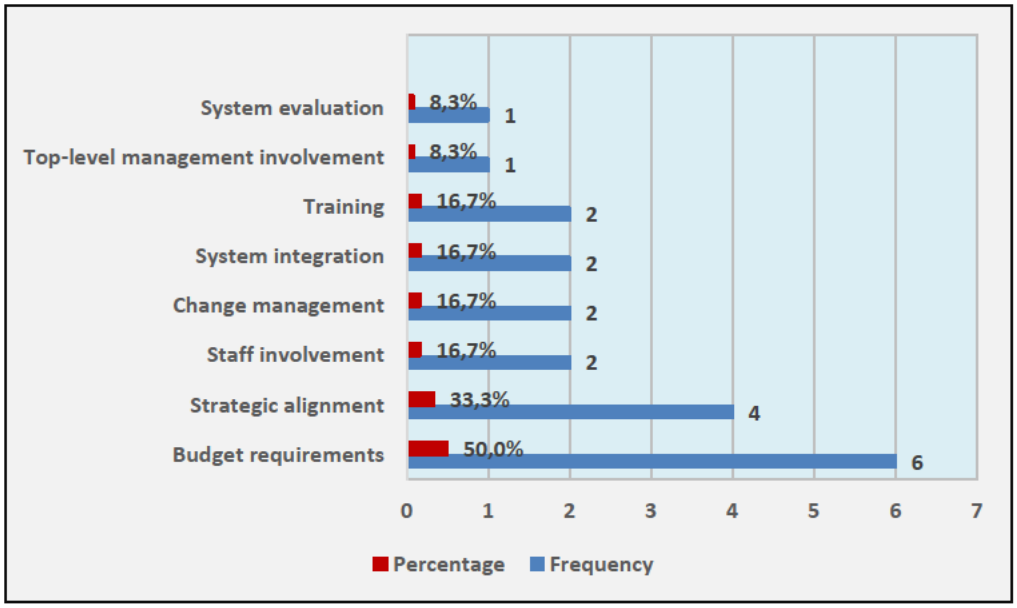

Figure 5-28 Library 4.0 Service Delivery

Table 5-44 shows LIS directors' responses and themes created on how their institution, from an executive management standpoint can assist their libraries in successfully providing Library 4.0 services.

Table 5-44 Responses LIS directors on Provision of Library 4.0 Services

What advice do you have for someone who needs to make the shift from traditional library integrated system (ILS) to a next generation integrated (ILS) library system to meet Library 4.0 goals in service delivery?	
Themes	**Responses**
Budget requirements	**Director 1:** *"I think support from the executive management should mostly be financial support."* **Director 4:** "*Support both human resource and financial resources needed to implement and render library 4.0 services."* **Director 8:** *"Support from ICT and executive management is important and financial support and human resources to enhance capacity for the staff members who are waiting to implement that new system"* . **Director 9:** "*Institution must support the library strategy and provide required financial resources for us to be able to meet the library 4.0 requirements for us to provide an effective service to our library users."* **Director 10:** "*To ensure that the funding is available to purchase the system because the university ICT is responsible for approval, you need to ensure that there is a buy in from executive management.*" **Director 11:** *"Provide adequate funds to support training initiatives and Identify core projects to build skills."*

What advice do you have for someone who needs to make the shift from traditional library integrated system (ILS) to a next generation integrated (ILS) library system to meet Library 4.0 goals in service delivery?	
Themes	**Responses**
Strategic alignment	**Director 1:** *"We need write proposals with a vision of the library and submit to our executive University management to ensure that the library to become part of the Fourth Industrial Revolution and providing library 4.0 service delivery to its users."* **Director 2:** **"***The executive management of the university can only make decisions or support the library if we are able to demonstrate the value of our services that and then our services are aligned with the library 4.0 services to ensure that teaching, learning, and research is successful at the university and how we add value to that".* **Director 6:** "*We align ourselves with the fourth industrial revolution and include AI (Artificial Intelligence) in our library operations the inventory can be done in one year for the whole library."*
Staff involvement	**Director 3:** *"Consultation with staff and communication are the vital keys in the successful migration of systems in libraries and successfully providing library 4.0 services."* **Director 8**: "*The executive management can assist in creating a conducive environment for staff to make it easy for staff to adapt to change and new technologies"*
Change management	**Director 2:** *"The impact of Covid-19 I in the last two years have shown us need to be technologically savvy to adapt to this new change by offering is service both hybrid and physical to support learning, teaching and research".* **Director 8:** *"The executive management can assist in creating a conducive environment for staff to make it easy for staff to adapt to change and new technologies"*

What advice do you have for someone who needs to make the shift from traditional library integrated system (ILS) to a next generation integrated (ILS) library system to meet Library 4.0 goals in service delivery?	
Themes	**Responses**
System integration	**Director 4:** *"Based on that you can decide like that I need to implement this new system but in terms of the institutional infrastructure the system will not be accommodated because of lack of integration with other systems."* **Director 7:** *"Finance system must integrate with the new system for procurement system"*
Training	**Director 5:** *"I think more than anything is the training sessions on library 4.0 tools and services for both staff and library users."* **Director 7:** "*We need the system that can integrate with library services platforms and operation, workflows artificial intelligence."*
Top-level management involvement	**Director 12:** *"Support from executive management."*
System evaluation	**Director 3:** *"System evaluation and testing is important".*

5.12 LIS Directors Skills Required in the Adoption and Maintenance of Next Generation ILS

LIS directors were asked to indicate the skills required in the adoption and maintenance of next generation ILS by LIS professionals in academic libraries. They were given an option to indicate if the skills were required or not required. Results indicated the responses of all 12 participants selection of skills applicable to them for effectively and efficiently managing the adoption and maintenance of the next generation ILS in their libraries.

5.12.1 Generic skills

Table 5-45 shows that while adopting and maintaining the next generation ILS in libraries, generic skills are required or not required. The results show that 93% of LIS directors interviewed indicated that generic skills are required for LIS professionals to adopt and maintain next-generation ILS in their libraries, while 10% said they were not.

Table 5-45 Generic Skills Required in the Adoption and Maintenance of Next Generation ILS

Skills	Required	% Required	Not Required	% Not Required	Total
Generic Skills					
Communication	11	91.7%	1	8.3%	12
Adaptability	11	91.7%	1	8.3%	12
Creativity	10	83.3%	2	16,7%	12
Analytical skills	11	91.7%	1	8.3%	12
Problem solving	11	91.7%	1	8.3%	12
Presentation skills	11	91.7%	1	8.3%	12
Time management	11	91.7%	1	8.3%	12
Decision making	12	100.00%	0	0%	12
Customer relationship	12	100.00%	0	0%	12
Flexibility	12	100.00%	0	0%	12

Skills	Required	% Required	Not Required	% Not Required	Total
Assertiveness	11	91.7%	1	8.3%	12
Stress management	11	91.7%	1	8.3%	12
Interpersonal skills	11	91.7%	1	8.3%	12

Figure 5-32 below shows the generic skills required by LIS professionals to adopt and maintain next-generation ILS in their libraries. The findings reveals that all 12 LIS directors (100%) interviewed indicated that customer relation, decision-making and flexibility skills are skills required; 11 (91%) participants indicated that presentation skills, time management, problem-solving, analytical skills, adaptability, and communication were all required; and 10 (83%) indicate that creativity skills are required.

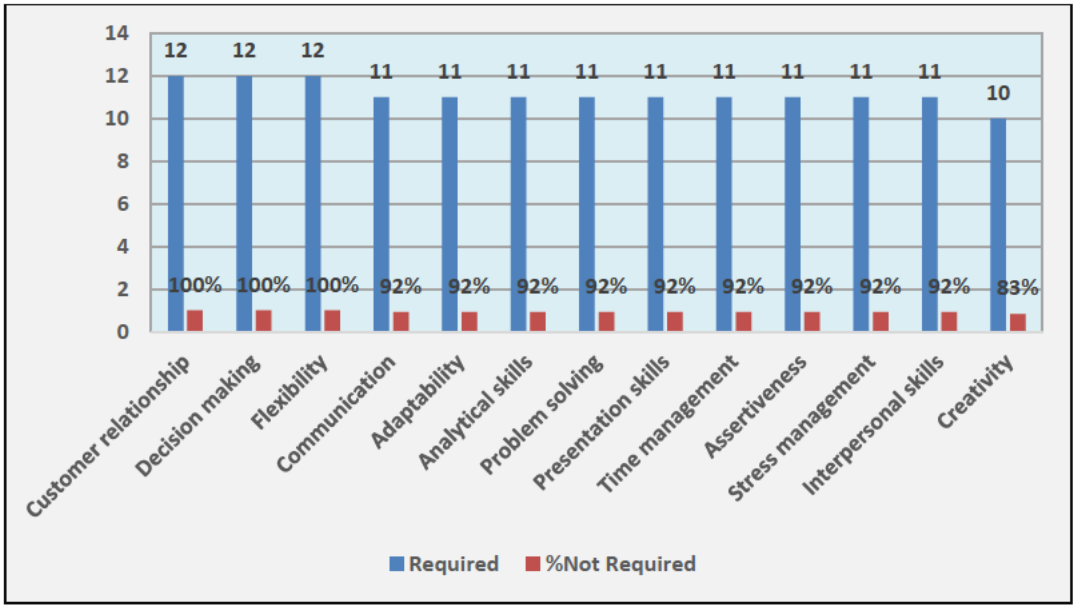

Figure 5-29 Generic Skills Required LIS Directors

The generic skills that LIS directors do not require to adopt and maintain next-generation ILS in their libraries are shown in Figure 5-33 below. The findings reveal that 2 (17%) of the participants said that creativity was not a skill that was necessary, while 1 (8%) of each participant said that communication, adaptability, analytical skills, presentation skills, time management, assertiveness, stress management, interpersonal and interpersonal skill were not required. None of the participants said that decision-making, customer relationships and flexibility were not required.

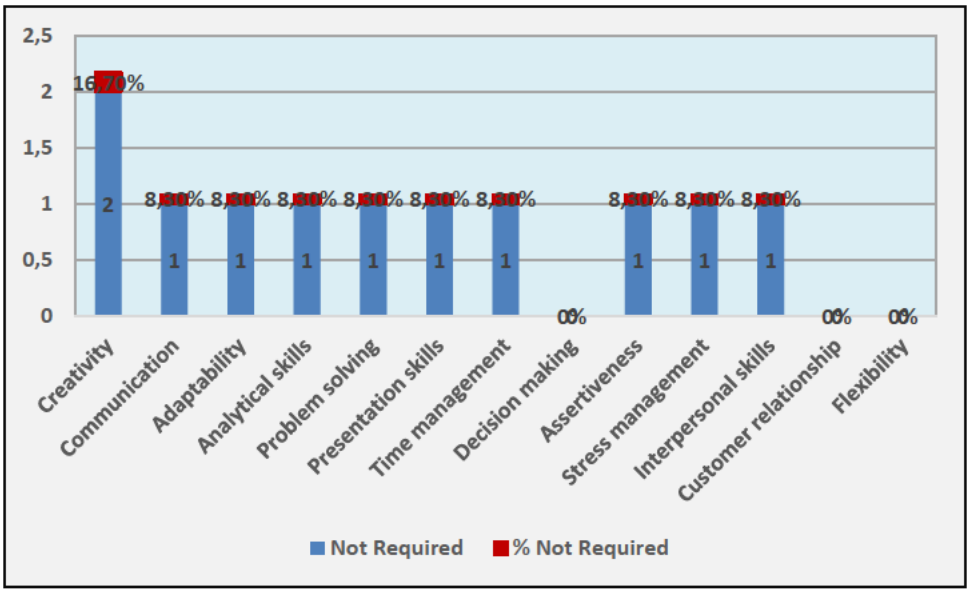

Figure 5-30 Generic Skills Not Required LIS Directors

5.12.2 Managerial skills

Table 5-45 shows that 99% of most LIS directors interviewed, 99% indicated that managerial skills are required, while 8% said they are not required for the adoption and maintenance of the next generation ILS in their libraries.

Table 5-45 Managerial Skills Required in the Adoption and Maintenance of Next Generation ILS

Managerial Skills					
Skills	**Required**	**% Required**	**Not Required**	**% Not Required**	**Total**
Planning and organizational skills	12	100.00%	0	0%	12
Finance management skills	12	100.00%	0	0%	12
Local and global thinking	12	100.00%	0	0%	12
Managing change	12	100.00%	0	0%	12
Team building	12	100.00%	0	0%	12
Leadership	12	100.00%	0	0%	12
Project management	12	100.00%	0	0%	12
Consumer management skills (User need analysis, Information seeking, behaviour analysis)	12	100.00%	0	0%	12
Resources management	12	100.00%	0	0	12
Negotiation skills	11	91.7%	1	8.3%	12

The managerial skills required by LIS professionals to adopt and maintain next-generation ILS in their libraries are shown in Figure 5-51 below. The findings show that 12 (100%) participants identified a requirement for skills in planning and organization, finance management, local and global thinking, managing change, team building, leadership, project management, consumer management (User need analysis, information seeking, behavior analysis), and resource management, while 11 (91%) participants identified negotiations skills as a need.

Figure 5-31 Managerial Skills Required LIS Directors

Figure 5-35 illustrates the managerial skills that are not required for the adoption and maintenance of the next-generation ILS in their libraries. The results show that 11 participants did not indicate any of the other skills listed as required, while 1 participant (8%) indicated that resource management is a skill that is not necessary.

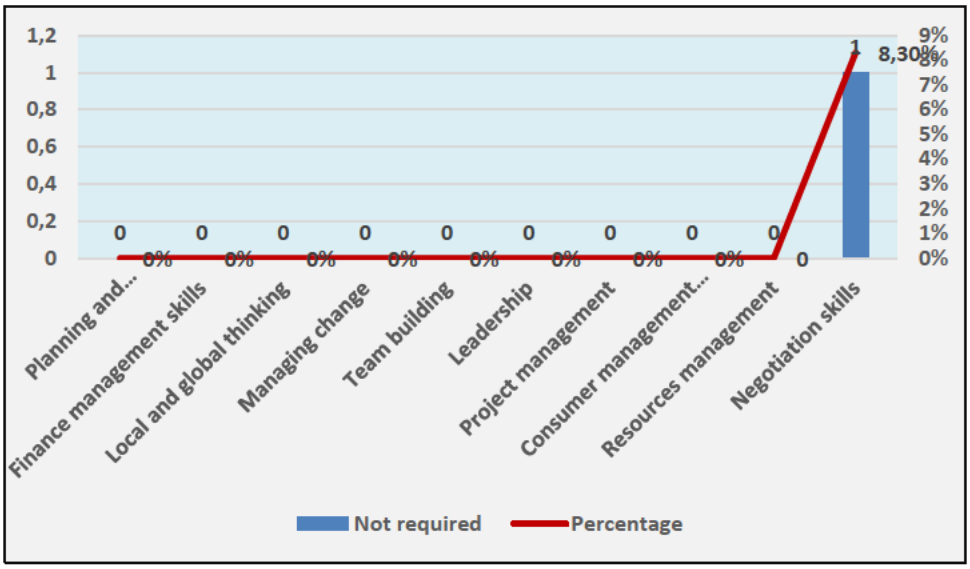

Figure 5-32 Managerial Skills Not Required LIS Directors

5.12.3 Professional Skills

To ascertain the type of skills LIS professionals possessed in academic libraries in South Africa, respondents were asked to select skill sets they have in addition to their qualifications required for making strategic decisions in their libraries.

5.12.4 Information technology (IT) skills

According to Table 5-46, of the LIS directors interviewed, 99% said that IT (Information Technology skills were required, while only 1% indicated that they are not required.

Table 5-46 Information Technology (IT) Required in the Adoption and Maintenance of Next Generation ILS

Information Technology Skills					
Skills	**Required**	**% Required**	**Not Required**	**% Not Required**	**Total**
Hardware/ software and networking skills	11	91.7%	1	8.3%	12
Library automation	12	100.00%	0	0%	12
Internet e.g., E- Mail management, Intricacies of internet search tools	12	100.00%	0	0%	12
Intranet skill	12	100.00%	0	0%	12
Networking skills	12	100.00%	0	0%	12
MS-suite	12	100.00%	0	0%	12
Presentation software e.g., PowerPoint	12	100.00%	0	0%	12

Figure 5-37 below illustrates the information technology skills required by LIS professionals to adopt and maintain next-generation ILS in their libraries. The results show that 12 (100%) of participants identified a requirement for skills in library automation, networking, MS Suite, presentation skills, Internet e-mail management, and the intricacies of Internet search tools. Eleven (91%) of participants identified hardware/software and networking skills as required skills.

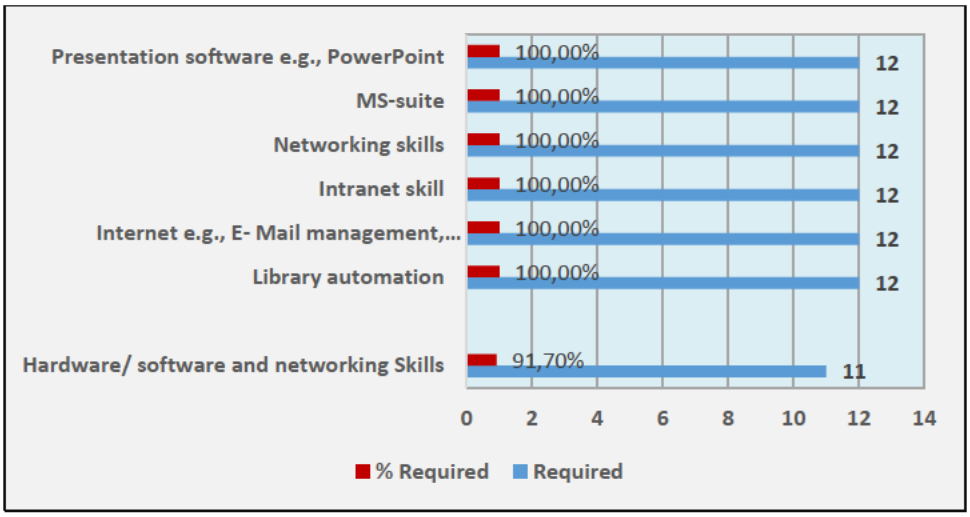

Figure 5-33 Technological Skills Required LIS Directors

The technological skills that are not required for the maintenance and adoption of the next-generation ILS in their libraries are shown in Figure 6-38. According to the results, 11 participants indicated that none of the other skills were stated were required, and only one participant (8%) indicated that hardware/software skills are not required. None of the other skills listed were required by LIS directors.

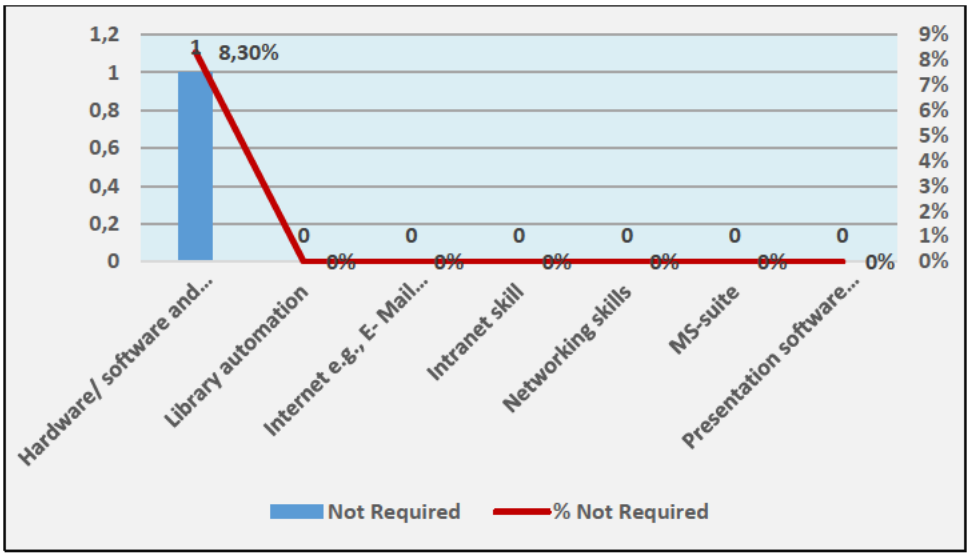

Figure 5-34 Technological Skills Required LIS Directors

5.12.5 Technical skills

Table 5-47 indicates that most participants (90%) of LIS directors interviewed indicated that technical skills are required while few LIS directors (7%) indicated that they are not required to effectively manage the adoption and maintenance of the next generation ILS in their libraries.

Table 5-47 Technical Skills Required in the Adoption and Maintenance of Next Generation ILS

Technical Skill					
Skills	**Required**	**% Required**	**Not Required**	**% Not Required**	**Total**
Information resource management	12	100.00%	0	0%	12
E- serial management	11	91.7%	1	8.3%	12
Metadata1 standards e.g., Dublin core, MARC, TEI2, XML3 etc.	10	83.3%	2	16.7%	12
Standards e.g., Z39.50	10	83.3%	2	16.7%	12
System development	11	91.7%	1	8.3%	12

Figure 6-39 below illustrates the information technology skills required by LIS professionals to adopt and maintain next-generation ILS in their libraries. The results show that 12 (100%) of participants identified a requirement for skills in library automation, networking, MS Suite, presentation skills, Internet e-mail management, and the intricacies of Internet search tools. Eleven (91%) participants identified hardware/software and networking skills as required skills, 10 (83%) identified standards e.g., Z39.50 and metadata standards.

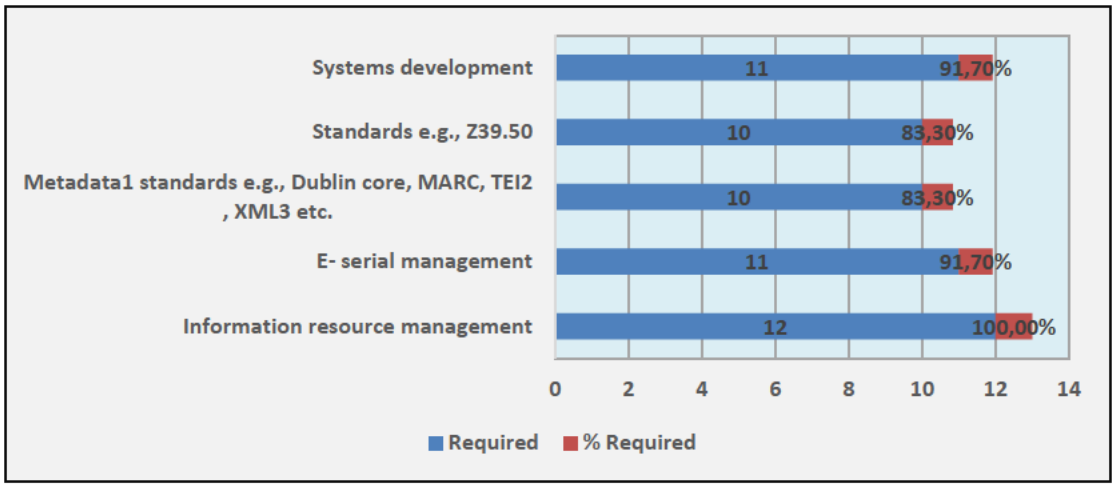

Figure 5-35 Technical Skills Required LIS Directors

The technical skills that are not required for the maintenance and adoption of the next-generation ILS in their libraries are shown in Figure 5-40. According to the results, 2 (17%) participants indicated that standards (e.g., X39.50) and metadata standards (e.g., Dublin core), and one participant (13%) indicated that E-serial management skills are not required. None of the participants selected information management as a skill not required.

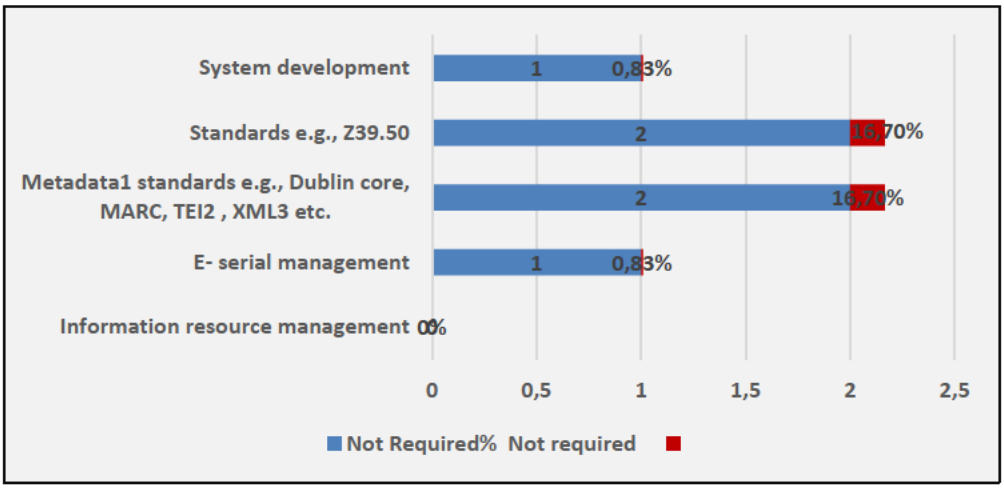

Figure 5-36 Technical Skills Not Required for Maintenance and Adoption

5.12.6 Library 4.0 tools skills

Table 5-48 indicates that all participants (93%) of LIS directors interviewed indicated that Library 4.0 skills are required while few LIS directors (8%) indicated that they are not required

to effectively and efficiently manage the adoption and maintenance of the next generation ILS in their libraries.

Table 5-49 Library 4.0 Skills LIS Directors

Library 4.0 Skills LIS Directors					
Skills	**Required**	**% Required**	**Not Required**	**% Not Required**	**Total**
Information resource management	12	100.00%	0	0%	12
Digital scanning, preservation	12	100.00%	0	0%	12
Cloud data expansion	10	83.3%	2	16.7%	12
In-depth research skills	11	91.7%	1	8.3%	12
Technology design and programming	11	91.7%	1	8.3%	12
Critical thinking and analysis	11	91.7%	1	8.3%	12
Emotional intelligence	11	91.7%	1	8.3%	12

Figure 5-41 in the following section demonstrates the library 4.0 skills needed by LIS professionals to implement and maintain next-generation ILS in their libraries. The findings reveal that 12 (100%) required information resource management, digital scanning, and preservation; 11 (91%) identified in-depth research skills, technology design and programming, critical thinking and analysis, and emotional intelligence as required skills; and 10 (83%) identified cloud data expansion as a requirement.

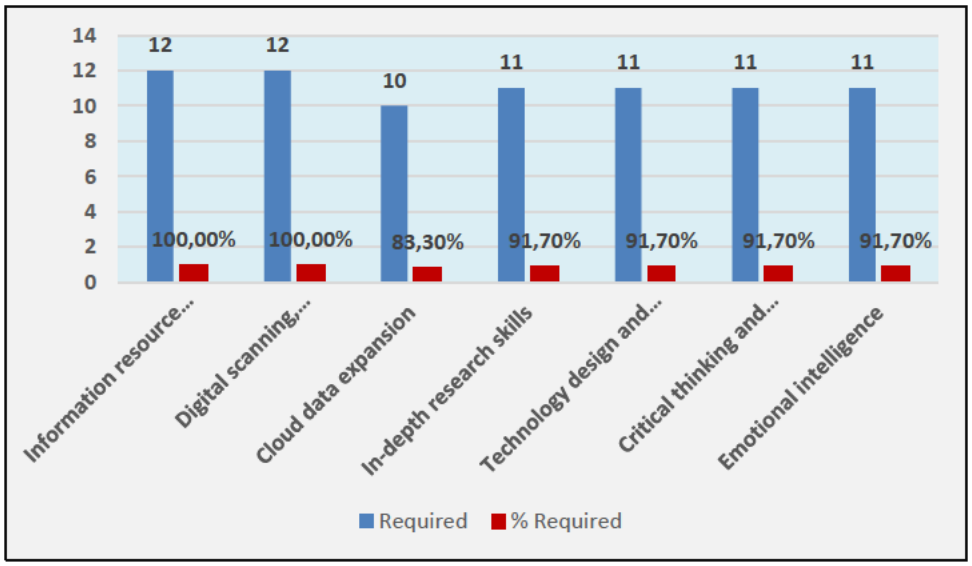

Figure 5-37 Library 4.0 Skills LIS Directors

The library 4.0 skills that are not required for the maintenance and adoption of the next-generation ILS in their libraries are shown in Figure 5-42. According to the results, 17% indicated respondents indicated that cloud data expansion is as a skill not required; while 8% respondents indicated that skills not required are: in-depth research skills, technology design and programming, critical thinking and analysis and emotional intelligence; none of the respondents indicated information resources skills and skills required.

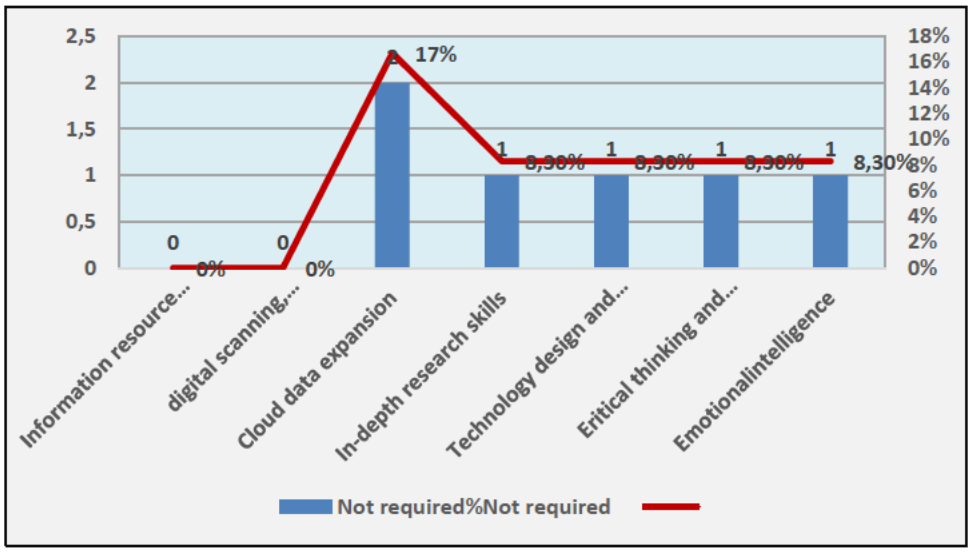

Figure 5-38 Library 4.0 Skills Not Required LIS Directors

5.13 Resource Sharing and Role of Library Consortia in South Africa

The library consortiums that the LIS directors belonged to were to be selected. Library consortiums serve as valuable for networking, resource sharing, and purchasing of the next generation ILS. Table 5-49 and Figure 5-43 show that many participants (58%) are members of the CHELiN (Cape Higher Education Libraries Network) consortium, while only 14% are members of the SEALS (Southeast Academic Library System) consortium. Surprisingly, most respondents (28%) who selected "other" explained that they no longer take part in consortiums because most of them have not flourished for more than ten years; in the past, they had been grouped into provinces in cooperation with their sister universities. SEALS in the Eastern Cape Province and CHELiN in the Western Cape Province are the only two consortiums.

Table 5-49 Role of Library Consortium

Consortium	n	%
CHELiN (Cape Higher Education Libraries Network)	51	58.62%
SEALS (Southeast Academic Library System)	12	13.79%
Other (Please specify)	24	27.59%

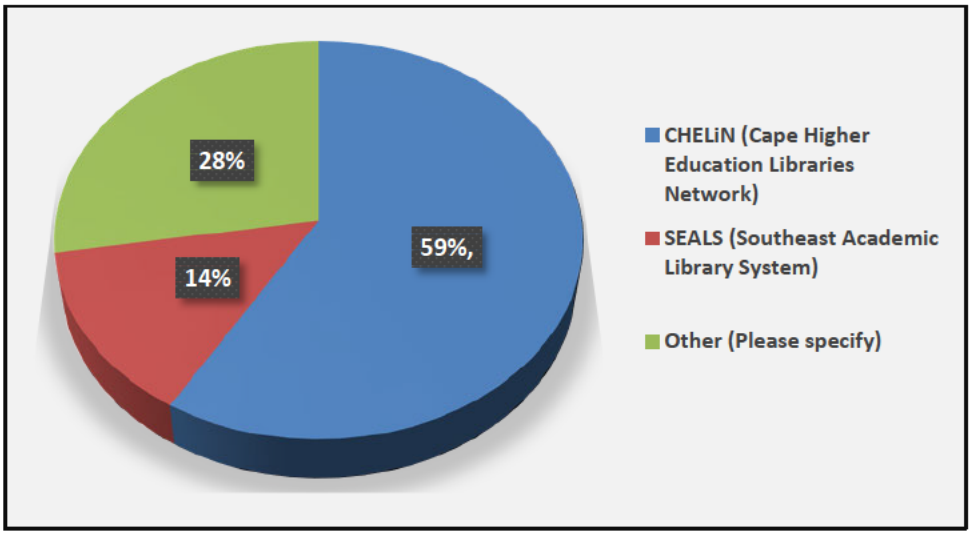

Figure 5-39 South African Library Consortiums

5.13.1 Value of library consortium

During interviews with directors, discussions explored the value of the library consortium in their respective libraries. Figure 5-44 displays emergent themes emanating from participant responses. The results show that more than half of respondents, or 58% (7 respondents), said that collaboration and benchmarking systems through consortium can add value to their libraries, a sufficient number of respondents, or 33% (4 responses), said that collectively purchasing systems among institutions can save money and add value to the library consortium, and only 8% (1 response) said that top-level management supporting the role of consortiums could add value to libraries.

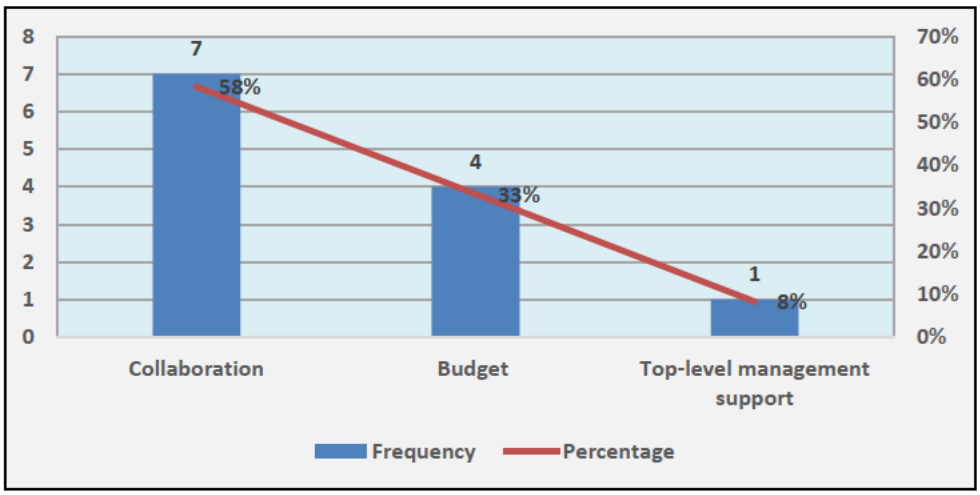

Figure 5-40 Value of Library Consortia

Three (3) themes emerged, namely budget requirements (7 responses), collaboration (4 responses) and top-level management support (1 response). Table 5-50 displays LIS directors' responses and themes generated when asked if consortia efforts are adding value to their organization.

Table 5-50 Themes Responses Value of Library Consortium

Interview Question: Are the consortia efforts delivering value to your organization	
Themes	**Responses**
Budget requirements	**Director 1:** *"Our institution is now working independently in terms of system purchases; ICT is responsible for funding and approval of budget".* **Director 5:** *"No, we do not currently have a consortium, we purchase our system individually through our institution as we are dependent on ICT for budget".* **Director 8:** *"There will be bargaining power in terms of collaboration that stand alone in purchasing of the library systems in South Africa. I will propose a national consortium that can consolidate other consortium like SEALS in the Eastern Cape and CHELiN in the western cape that will assist libraries in South Africa saving costs."* **Director 11**: "*Think the consortium can add value on system the collective buying of systems amongst 26 public universities to save costs*".

Interview Question: Are the consortia efforts delivering value to your organization	
Themes	**Responses**
Collaboration	**Director 1:** *"In my previous institution we used to belong to Calico (CHELiN)_for collaborating in library system purchases."* **Director 2:** *"The previous consortia were Calico and now called CHELiN collaboration of the four universities in the Western Cape for collaboration in system purchases although each institution finances their own systems".* **Director 4:** *"I think we need consortiums to deal with the systems purchases and collaboration like we did in the previous consortium like GAELIC. We need a consortium to support system purchasing and collaboration in terms of prices and saving library costs in system purchases and share best practices and standards".* **Director 5:** *"Think if we can have a national consortium, it would save us costs one and create more collaboration and sharing skills. We are working in silos, and we need a national consortium in south Africa to share different skills in different regions".* **Director 6:** "*We belong to SEALS consortium for collaboration, benchmarking, and best practices but we purchased our system independently in collaboration with our institutional ICT."* **Director 8:** "*We do not belong to a consortium currently because the consortium is no longer in operation. We used to belong to GAELIC previously, in case of purchasing system we have done it individually and have not collaborated with other libraries because consortiums are no longer operational".* **Director 12***:* "The consortium will bring value through collaboration and resources sharing to save costs and collective purchase of the system. I think that a National Consortium needs to exist to include all universities and must have the power to negotiate prices for purchasing the system and strengthen their contracts and SLA (Service Level Agreements".
Top-level management support	**Director 10:** *"Support from the institution particularly executive management because their role is to make sure that the funding required is available*"

5.13.2 The support of consortia in enhancing the library automation

The LIS directors were asked how the support from consortiums would enhance their status in terms of library automation. The created frequency themes are displayed in Figure 5-41 More than half (66%, or 8 respondents) stated that resource sharing and collaboration through consortium efforts can improve the library automation status; (25%, or 3 respondents), that purchasing systems collectively among institutions can benefit the library consortium and save money; and (17%, or 2 responses), that training of library professionals can add value to the consortium in library automation.

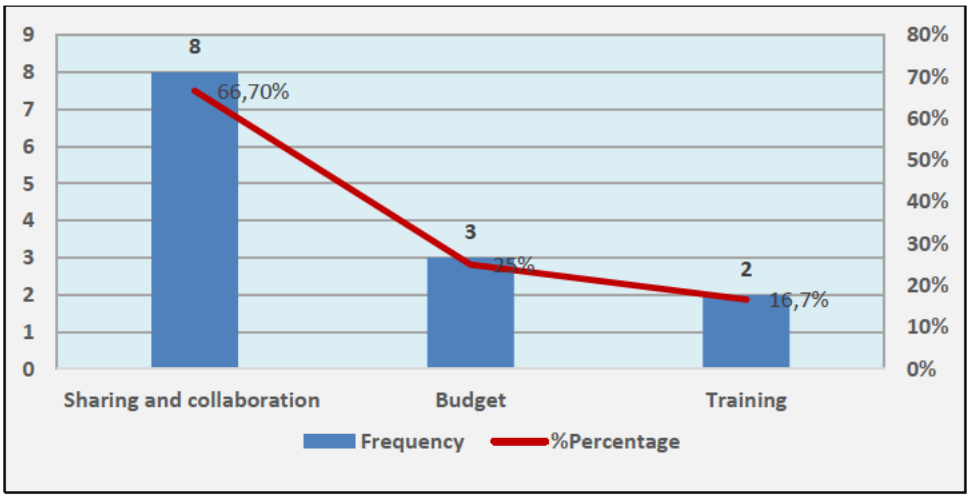

Figure 5-41 Value of Consortium in Library Automation

Three (3) themes were created namely: resource sharing and collaboration (8 responses), budget (3 responses) and training (2 responses). Table 5-52 displays LIS directors' responses and themes generated when asked if the support and information they received from consortia enhance their library automation status.

Table 5-51 Themes Value of Consortium in Library Automation

Interview Question: Are the consortia efforts delivering value to your organization?	
Themes	**Responses**
Resource sharing and collaboration	**Director 2:** "*Collaboration and benchmarking are important for delivering consortia efforts and delivering value but as I mention we do not share systems*". **Director 4:** "*I think we need the support of consortium, and we need other libraries that are using Sierra to come on board for more collaboration and benchmarking".* **Director 5:** *"In my experience is that if we belong to a consortium within which we operate, it enhances the operations of the systems and system updates, it is easier for us to change as a collective and share that experience and the skills then gets shared in a wider platform".* **Director 6:** *"I think consortium can bring value in terms of collaboration and sharing especially regarding ICT and systems".* **Director 8:** "*Yes, in will as value to library automation, it is important to collaborate and share best practices especially with those libraries that already adopted to the system."* **Director 9:** *"We need something bigger than SANLIC or CHELSA taking the role or look broader to have a National Consortium integrating all areas. SANLIC is just focusing only on electronic resources in terms of negotiating their purchases and licensing agreement and it does not.* *look at the library management systems or ILS."* **Director 10:** "*I think the consortium can add value on the automation in terms of benchmarking and collaboration*". **Director 12:** *"I think the consortium can add value on the automation in terms of benchmarking and collaboration".*

Budget	**Director 2:** *"I think sharing systems will be a cost benefit to academic libraries."* **Director 7** *"There will be bargaining power in terms of collaboration that stand alone in purchasing of the library systems in South Africa. I will propose a national consortium that can consolidate other consortium like SEALS in the Eastern Cape and CHELiN in the western cape that will assist libraries in South Africa saving costs"* **Director 8** *"I think the consortium can add value on system the collective buying of systems amongst 26 public universities to save costs".*
Training	**Director 2:** *"it is important for community of practice, training, and professional exchange. We have Tenant for training staff with IT skills for enhancement of library automation*". **Director 3:** *"We have Tenant which provide IT training but since was put on hold during lockdown but will resume those trainings".*

5.14 Data Security and Protection

To identify who in their organization oversees data protection, LIS directors were asked to choose a specific option. The results shown in Figure 5-41 and Most respondents (33%) selected CTS (Computer and Telecommunication Service Director), 26% selected compliance and risk officer, 18% selected data protection officer, -% selected compliance and risk officer, and other (7%) respondents who selected others indicated that the governance committee oversees data security and protection.

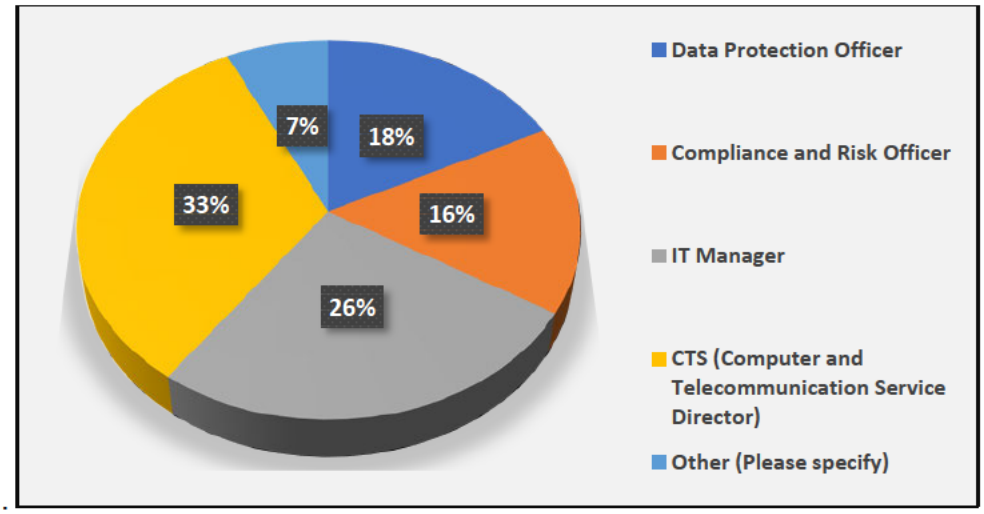

Figure 5-41 Data Protection and Security Role Players

5.14.1 Organization's general level of data protection awareness

The general level of data security awareness in each participant's organization was questioned. This question received responses from all twelve participants. Table 5-52 demonstrates that a high percentage of respondents were interested in learning more about the organization's level of data protection and security training. Security awareness and data security were rated as high risks by 50% (6 responses); risk officers oversee managing cyber security awareness, according to 33% (4 responses); 17% (2 respondents) said that the CTS department authenticates each email before it is received or sent by staff. Social media and email misuse received another lower 16% (2 responses).

Table 5-52 Level of Data Protection Awareness

Theme	n	%
Security training awareness	6	50.0%
Cyber security awareness	4	33.3%
Email misuse	2	16.7%
Social media	2	16.7%

Table 5-53 displays LIS directors' responses when asked on their organization's overall level of data security awareness.

Table 5-53 Responses Organization's Overall Level of Data Security Awareness

Interview Question: What do you think your organization's general level of data protection awareness is?	
Themes	**Responses**
Cyber security awareness	**Director 3:** "*We get frequent notices from CTS informing us about being what's the word be aware e.g., the phishing scams and hacking scams and how to protect our data from being accessed".* **Director 8:** *"In terms Data security and compliance is handled at the institutional level be CTS. In the library we create cyber security awareness and I we have data and information that we need secure the library system and platforms in collaboration with the system librarian, library IT Team and CTS will assis*t". **Director 12:** *"The security awareness and data security are a high risk, in terms of cyber security awareness is managed by risks officers in collaboration CTS".*

Interview Question: What do you think your organization's general level of data protection awareness is?	
Themes	**Responses**
Security training awareness	**Director 4:** "*Staff are alerted via emails and CTS staff will organize training for staff to create awareness".* **Director 5:** *"The IT people are sent to training, and they sent to work workshops and webinars to create awareness of data privacy and security".* **Director 7:** "*We are getting a high priority awareness and training in terms of data university from the university. Data security form part of high-risk categories in the university*". **Director 9:** *"CTS is responsible and everyone in the organization has high level of awareness, staff are well trained regularly and updated on data securities and risk are managed very well".* **Director 12:** *"Made aware of phishing and awareness of fake news on how to spot them, users are trained, especially researchers".* **Director 11:** "*The security awareness is fair and data security, compliance and training is handled at the institutional level be CTS".*
Email misuse	**Director 1:** "*The ICT department is the responsible department for data protection and awareness. The ICT department sent emails alerts to the staff of any unauthorize access and will inform the university community of any bridge of firewalls and computer viruses".* **Director 2:** *"We have systems that you have in place like for response to ensure that staff are complying for example, they will send random emails to staff to test if they are aware of security or conduct surveys. ICTs are extremely on the careful phishing attempts. So, we get notifications on the firewall".*

Interview Question: What do you think your organization's general level of data protection awareness is?	
Themes	**Responses**
Social media	**Director 3:** *"Notices go out to all staff and students to create awareness so that they do not fall prey, videos will be sent for staff to answer some question on cybersecurity. We had quite a number of those questionnaires requests to complete during the lockdown and received emails with YouTube videos to create awareness".* **Director 12:** "Compulsory training via you-tube videos is send via an email link to encourage staff to participate".

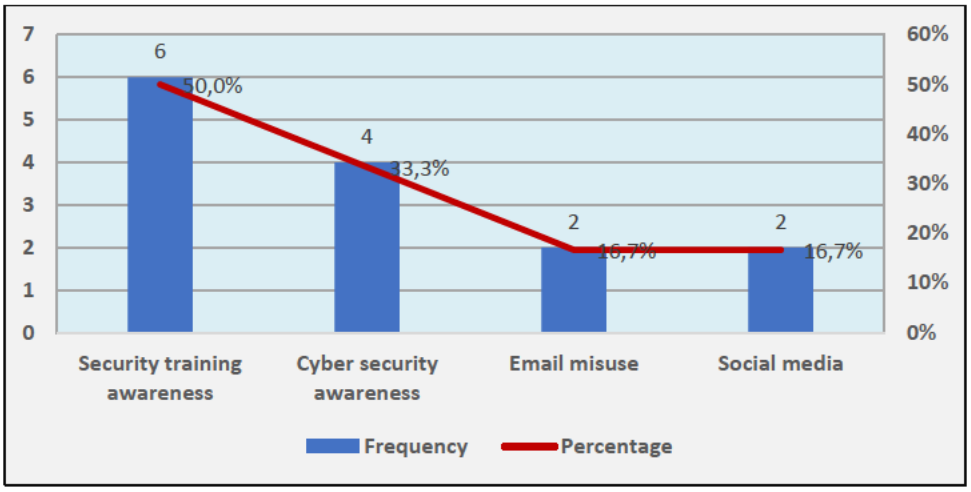

Figure 5-42 Level of Data Protection Awareness

Table 5-53 and Figure 5-42 show that six (50%) of the participants selected security and training awareness as part of their organization commitment of creating data protection awareness to their employees, (3%) selected cyber security awareness, 2 (17%) selected email misuse and social media.

5.14.2 Steps in Data and Network Security used to assist in maintaining data security compliance

The LIS directors were requested to list the data and network security measures used to help maintain data security compliance. The steps needed were data sharing 33% (4 responses), user

privileges and authentication 33% (4 responses), staff training 25% (3 responses), and risk management, 8% (1 response each), as shown in Figure 5-48.

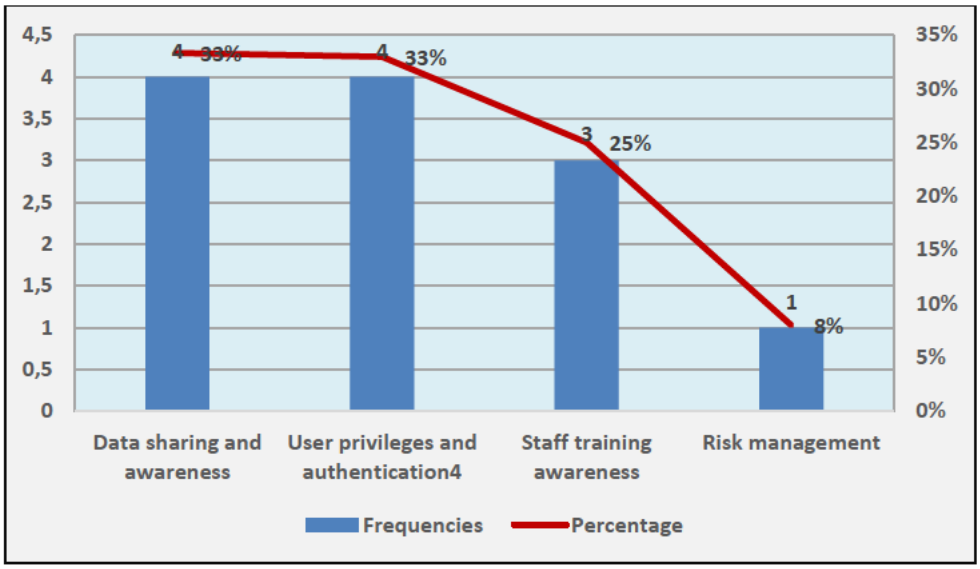

Figure 5-43 Steps in Data and Network Security

Table 5-54 displays LIS directors' responses generated when asked on steps in data and network security they use to assist in maintaining data security compliance in their organizations.

Table 5-54 Steps in Data and Network Security

Interview Question: Which systems/steps to Data and Network Security do you employ to assist you in maintaining data security compliance?	
Themes	**Responses**
Data sharing	**Director 8:** "*In terms of the research landscape the policies like POPIA need to be considered. Previously libraries used to share information but now we are restricted in terms of open access policies, and we need to be sensitive in sharing data or personal information and adhere to policies, guidelines, and legislature in terms of data sharing*". **Director 10:** "*In terms of information access and data sharing and research we need to adhere to POPIA, and Open Access polices".* **Director 9:** *"Adhering to POPIA and other law regulation relating to information access*" **Director 12:** "*We need to comply to POPIA especially on research support and sharing sensitive information about clients, the library has an updated POPIA on and the awareness and promotes to the rest of library and communities".*
User privileges	**Director 1:** "*Databases are password protected and staff members that have right of access to a system database get authentication to access library databases via their login and passwords*"' **Director** "*Systems and platforms are password protect and accessible via IP addresses for authentication. We get notifications on the firewall in case of security bridges.* **Director 6:** *"Our cloud is running on one drive, and should it be hacked, it can be spotted immediately as we were working from through user IP address and authentication"* **Director 6:** *"Working remotely, we have passwords that are protected, and you and alerted immediately if there is unauthorized login. The access of information is controlled*

Interview Question: Which systems/steps to Data and Network Security do you employ to assist you in maintaining data security compliance?	
Themes	**Responses**
Staff training	**Director 3:** *"CTS is responsible, but we do recommend staff to attend training provided for creating awareness for data security and compliance".* **Director 4:** "*Staff are alerted and get training from CTS, so the responsibility lies with them*". **Director 5:** "*Staff to train are send to training and emails alerts in case of fishing*".
Risk management	**Director 7:** "*We are getting a high priority awareness in terms of data university from the university. Data security form part of high-risk categories in the university".*

5.14.3 Factors affecting data privacy and security in academic libraries

Regarding varied factors affecting their institutions' data security and privacy, LIS twelve Directors responded to this question. Table 5-55 and Figure 5-49 show that, according to participants, data sharing accounted for 58% (7 respondents) of the factors affecting data privacy and security in libraries. The importance of configuring the system so that unnecessary functionalities are immediately disabled when known vulnerabilities exist is highlighted by 50% (6 respondents). Staff awareness and training accounted for 25% of the (3 respondents). Surprisingly, risk management was mentioned by one respondent (8%).

Table 5-55 Factors Affecting Data Privacy and Security

Factors	n	%
Data sharing	7	58.3%
Secure configuration	6	50.00%
Staff raining and awareness	3	25.0%
Risk Management	1	8.3%

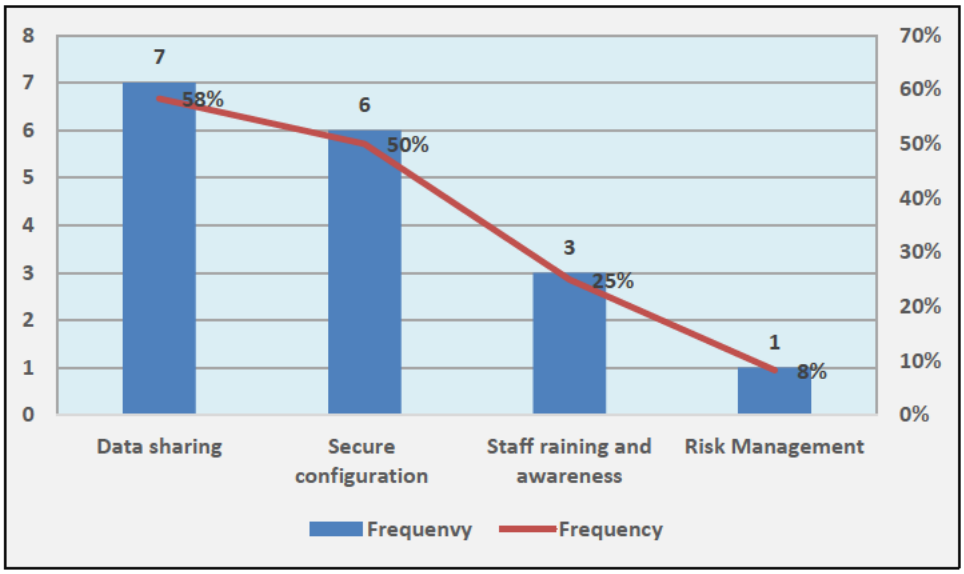

Figure 5-44 Factors Affecting Data Privacy and Security

Table 5-57 displays LIS directors' responses and themes factors affecting data privacy and security in their organizations.

-

Table 5-56 Influence of privacy and security on LIS professionals and executive managers

Interview Question: How does privacy and security affect LIS professionals and executive management roles in the adoption and maintenance of the next generation ILS in academic libraries?	
Themes	**Responses**
Data sharing	**Director 1:** *"We need to comply to POPIA especially on research support and sharing sensitive information about clients, the library has an updated POPIA on and the awareness and promotes to the rest of library and communities".* **Director 2:** *"We adhere and comply to POPI Act and so we've got to be very careful about the access rights that are granted to different levels of staff for sharing data".* **Director 5:** *"I think more librarians want to share information as part of their careers, but the privacy policies and security affect you in terms of sharing that information. So, we are becoming very selective in sharing the information and we are regulated by Policies such as POPIA".* **Director 8:** *"The library is receiving awareness from CTS and if there is a needed it is accelerated in the library to assist staff in managing, sharing data and data security."* **Director 9:** *"We are very sensitive in sharing data, and we create awareness of fake news and adhere to regulations like POPIA for access and protection of intellectual property rights for data sharing".* **Director 11:** *"It is important for all LIS professionals to have superior knowledge of POPIA and how it impacts on library systems, services, and processes for data sharing".* **Director 12:** *"In terms of data security and ethics we need a centralized department to look at this role for the entire institution and the library for data sharing".*

Interview Question: How does privacy and security affect LIS professionals and executive management roles in the adoption and maintenance of the next generation ILS in academic libraries?	
Themes	**Responses**
Secure configuration	**Director 1:** *"ICT department to ensure that the Sierra system that the library is using is protected for information needed for their personal profiles on the circulation system to ensure that their personal information is shares to another third.* *parties".* **Director 4:** *"Firewalls are used to ensure that the is no data bridge and that all the logins are password protected'.* **Director 6:** *"The CTS department will drop emails to alert us about data security and awareness of phishing and cybersecurity. Other staff are still negligent and ignore CTS department not to open email coming from unreliable sources".* **Director 7:** *The CTS department will drop emails to alert us about data security and awareness of phishing and cybersecurity. Other staff are still negligent and ignore CTS department not to open email coming from unreliable sources".* **Director 9:** *"There is system in place like firewalls, passwords are protected".* **Director 10:** *"There is system in place like firewalls, passwords are protected"*
Staff training and awareness	**Director 2:** *"Frequent reminders are sent to staff and students to participate in those trainings and complete surveys regarding data security and compliance."* **Director 7:** **"***It is the responsibility of CTS to manage and raise train staff and raise awareness and protection of data".* **Director 4:** *"Staff get alerted via emails on data security and privacy and sometimes ICT will arrange training for staff".*
Risk Management	*"Non-compliance as a high risk for data security because if staff or users don't comply the put the organization and reputation of the company. Data security as a high risk that needs* to be prioritized by management"

5.15 Coding process and emerging themes

Qualitative data analysis of empirical data collected during interviews with the 12 LIS Directors from 10 academic libraries in South Africa led to the emergence of 31 major themes linked to 74 sub-themes comprising a total of 184 codes. Table 6-57 tabulates the relationships between emergent themes, associated codes and sections in the chapter which itemizes the extracted codebook elements. Elements of the table have been sorted alphabetically in the first column, Themes.

Table 6-57 Summary of Emergent Themes, Associated Codes and Chapter Sections

Themes	Codes	Sections
Budget: challenges	• A lack of funding • Decisions based on cost and service	6.3.6
Budget: consortium and library automation	• Offers a cost benefit. • Increase bargaining power	6.6.2
Budget: goals in service delivery	• Value of costs viewed realistically. • Short-term costs matched to long-term gains	6.3.8
Budget: new system implementation	• Audits identify user and budget requirements. • Connected to SAP • A team of analysts determines needs. • Budgets and funding are needed for maintenance. • Issue of cost and affordability of systems • A competitive market for tendering and procurement • Alignment between budget and strategy	6.3.5
Budget: provision of Library 4.0 services	• Executive financial support • Support from HR and finance. • ICT support • Institutional support • Availability of funding • Funds for training	6.3.9
Budget: value of library consortium	• Independent purchasing • Individual purchase with ICT dependence • Some bargaining power with a consortium • Consortium can add value	6.6.1
Change management: challenges	• Staff anxiety	6.3.6

Themes	Codes	Sections
Change management: critical implementation steps	• Readiness for change and anxiety over big adjustments	6.3.5
Change management: goals in service delivery	• Involvement of young generation movement • Review latest trends. • Internal conversations • Develop an understanding of cloud technology. • Application of change management techniques	6.3.8
Change management: IT functionality obstacles	• Expectations of new generation staff • Awareness of current trends • Fear of adoption of technology	6.2.3
Change management: provision of Library 4.0 services	• Offering hybrid and physical learning support • A conducive staff environment	6.3.9
Change management: reducing failures	• Acknowledge levels of anxiety • Reduce fear of adapting • Align libraries with technological trends	6.3.7
Change management: staff complements	• Staff adaptation • Change in traditional role. • Change in job descriptions. • A shift towards IT support	6.2.2
Collaboration: critical implementation steps	• Role of institutional ICT department • Stakeholder involvement • Meetings with IT directorate	6.3.5
Collaboration: reducing failures	• Supports a lack of technical knowledge	6.3.7
Collaboration: value of library consortium	• Institutions may belong to a consortium yet purchase separately. • Consortium provides support for purchasing costs and collaboration. • Consortiums bring value	6.6.1
Computer and self-efficiency: towards training quality	• Priority for staff trained on the new system. • Specific training for LIS professionals	6.3.4
Cyber security awareness: level of data security	• Notification regarding phishing and hacking from ICT department • Handled by ICT department. • A substantial risk	6.7.1
Data security: challenges	• Security and cloud-based changes	6.3.6
Data security: critical implementation steps	• Focus on data security, recovery, and migration	6.3.5

Themes	Codes	Sections
Data security: goals in service delivery	• Collaboration agreements required. • Training needed	6.3.8
Data sharing: data and network security	• For research landscape consider POPIA • Adhere to open access policies	6.7.2
Data sharing: influence of privacy and security	• POPIA compliance • Adherence to access rights • Policies affect ability to share. • Awareness notices arrive. • Sharing is a sensitive topic. • Is an institution-wide consideration	6.7.3
Email misuse: level of data security	• ICT responsibility • Systems do the checking	6.7.1
Interdepartmental communication: reducing failures	• A need to meetings with involvement of all • Support for good planning	6.3.7
Library restructuring: staff IT support	• Problem of a centralised IT function • Some key positions not replaced	6.2.4
Project management: critical implementation steps	• Project renewal exercise • Stakeholder involvement	6.3.5
Project management: reducing failures	• Application of change management processes • Holistic approach to implementation • A project team who reviews specifications • Clear articulation of specifications • Project planning with stakeholder involvement	6.3.7
Remote working: challenges	• Trouble shooting from home	6.3.6
Remote working: IT functionality obstacles	• Creating the right environment • New blended systems • Queries regarding virtual space • The challenge is user access	6.2.3
Remote working: staff complement	• A shift to a hybrid approach • Emergence of redundancies	6.2.2
Remote working: staff IT support	• Major challenge of budget to sort hybrid work	6.2.4
Resource sharing and collaboration: consortium and library automation	• Consortia enable benchmarking. • Enhances operations. • Collaboration specific to ICT and systems • Facilitates electronic resources	6.6.2
Risk management: data and network security	• High priority awareness alerts	6.7.2

Themes	Codes	Sections
Risk management: influence of privacy and security	• Compliance policies	6.7.3
Secure configurations: influence of privacy and security	• An ICT assurance • Firewalls • Alert via emails. • Password protection systems	6.7.3
Security training awareness: level of data security	• Alerts received via email. • IT people receive training. • A high-risk category • Institutional compliance requirements Organisation-wide awareness with training	6.7.1
Social media: level of data security	• Institution sends out notices and videos addressing cybersecurity. • Compulsory training	6.7.1
Staff involvement: challenges	• Communication • Attitudes	6.3.6
Staff involvement: goals in service delivery	• Staff expertise in roles they play. • Importance of internal conversations	6.3.8
Staff involvement: provision of Library 4.0 services	• Staff consultation and communication	6.3.9
Staff retention: IT functionality obstacles	• The challenge of understanding library systems	6.2.3
Staff retention: staff complement	• Prominent level of post graduate qualifications • Retirement age was reached	6.2.2
Staff training: challenges	• A lot of change going on	6.3.6
Staff training: consortium and library automation	• A community of practice • Provision of IT training	6.6.2
Staff training: data and network security	• ICT responsibility • Alerts provided. • Training concerning phishing	6.7.2
Staff training: influence of privacy and security3	• Frequent reminders • Responsibility of ICT department • Alerts arrive via emails	6.7.3
Staff training: provision of Library 4.0 services	• Use of tools for all	6.3.9
Staff training: reducing failures	• Provide technical support	6.3.7
Staff training: staff complement	• Personal upskilling • More professional qualifications	6.2.2
Staff training: staff IT support	• Insufficient IT staff • Challenge of computer programming	6.2.4

Themes	Codes	Sections
Strategic alignment: provision of Library 4.0 services	• Proposal and vision documentation. • Demonstration of value of services • Alignment with fourth industrial revolution	6.3.9
System evaluation: goals in service delivery	• Marketplace evaluation • Evaluation and benchmarking for best fit	6.3.8
System evaluation: provision of Library 4.0 services	• Role played by evaluation and testing	6.3.9
System integration requirements: new system implementation: critical implementation steps	• Integration of differing systems and platform • Alignment with a library strategy • Search for suitability, availability for integration. • Support from ICT • Aim for automation. • Consider compatibility. • System evaluation to meet objectives	6.3.5
System integration: challenges	• Effectiveness of cloud-based systems together with software requirements • Hindrances of institutional server and firewall • A search for evidence of streamlining of workflow. • Failed system updates • Loss of data during migration • Service level agreements. • Integration of open-source systems	6.3.6
System integration: goals in service delivery	• Look at new infrastructure. • Review institutional technology infrastructure tools	6.3.8
System integration: provision of Library 4.0 services	• Implement considering institutional infrastructure. • Integration of finances	6.3.9
System integration: reducing failures	• Avoidance of data loss during integration • Ensure smart ICT teams. • Knowledge of system evaluation • Do timely investigation and configuration	6.3.7
Top level management support: IT functionality obstacles	• Staff reluctance to explore new technology	6.2.3
Top-level management support: challenges	• Fear of lack of access to resources	6.3.6
Top-level management support: goals in service delivery	• Important buy-in from executive management	6.3.8

Themes	Codes	Sections
Top-level management support: provision of Library 4.0 services	• Focus on executive management	6.3.9
Top-level management support: reducing failures	• Staff user involvement	6.3.7
Top-level management support: value of library consortium	• Valued for executive decision-making regarding funding	6.6.2
Training and development: IT functionality obstacles	• Increased library qualifications • Skills identification plan • Technologically savvy • A lack of training and awareness	6.2.3
Training curriculum: goals in service delivery	• Skills for fourth industrial revolution	6.3.8
Training curriculum: towards training quality	• Continual training plans regarding information literacy	6.3.4
User commitment requirements: towards training quality	• Users need to acquire new skills. • End user needs and demands. • Ease of use training	6.3.4
User involvement: IT functionality obstacles	• Create guides and training aids. • An institutional lack of library systems	6.2.3
User privileges: data and network security	• Password protected databases. • Password protected systems and platforms. • Cloud services protected from hacking. • Password protection for remote work	6.7.2
Vendor support: challenges	• Vendor contract extensions for migration purposes	6.3.6
Vendor support: critical implementation steps	• 24-Hour support	6.3.5
Vendor support: reducing failures	• Needed regular meetings. • Critical understanding of service level agreements • Reducing challenges of a new system • Addressing user failures • Depends on watertight agreements. • Problem of cloud hosted system	6.3.7

5.16 Summary

Chapter 5 presented the findings of the study. The findings were based on data collected via a Web survey of 91 LIS professionals from seventeen academic libraries in South African public universities, interviews with twelve LIS directors who indicated that they have adopted next

generation ILS in their libraries. Qualitative data analysis of empirical data collected during interviews with the 12 LIS Directors led to the emergence of 31 major themes linked to 74 sub-themes comprising a total of 184 codes. Table 6-34 tabulates the relationships between emergent themes, associated codes and sections in the chapter which itemize the extracted codebook elements. Elements of the table have been sorted alphabetically in the first column, Themes. Chapter 6 discusses the main findings of the study in relation to the aim and objectives of the study and its critical questions, the theory framing the study, as well as the literature that was reviewed for the study.

CHAPTER 6 SUMMARY OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS OF THE STUDY

6.1 Introduction

Chapter 5 presented the findings of the two datasets, based on the data that was collected from the Web survey questionnaire. LIS professionals from seventeen academic libraries in in |South Africa participated in the Web survey, with selected LIS directors participating in the semi-structured interviews. This chapter discusses findings relevant to the objectives of the study and the critical questions that were generated to address this objective. In view of the researcher's choice of pragmatism as epistemological lens for this study, an inductive approach is undertaken in understanding and discussing the two datasets of findings. This is done from different viewpoints and in the context of the theoretical system underpinning this study as well as literature reviewed. The main objective of this study was to explore the '*Development of a Model for Decision-Making for the Adoption and Maintenance of the Next Generation Integrated Library Systems (ILS) in academic libraries in South Africa*'. The critical questions generated to meet the study's objectives were:

[RQ1]: What is the nature and extent of the adoption and maintenance of the next generation library ILS in academic libraries in South Africa?

[RQ2]: What are the requirements to determine competencies among LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries?

[RQ3]: How is privacy and security maintained in the adoption of the next ILS in academic libraries?

[RQ4]: What model can be developed for the successful adoption and maintenance of the next generation ILS in academic libraries?

The researcher collected two different sets of data to answer the research questions. A set of quantitative and qualitative data was collected from LIS professionals and LIS directors using

a questionnaire design based on elements identified in the literature and the theory adapted for the study. The questionnaires were divided into the following major sections:

1. Demographic information.
2. Organizational function.
3. Background information.
4. Technological impact of the next generation ILS in libraries.
5. Library professional skills in the adoption of in the next generation ILS.
6. Resources sharing and role of library consortium.
7. Data privacy and security.

In an endeavor to address the research questions, data collection encompassed a wide range of data collection perspectives, considered the context of the theoretical framework underpinning this study and took cognizance of reviewed literature. The study's main goal was to develop a model for decision-making for the adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa.

6.1.1 Demographic Information

Previously, LIS professionals in academic libraries were dominated by females than males. To ascertain the demographic information and to address gender equality, the participants were asked to select their sexual orientation that they preferred to be identified within their organizations. Furthermore, other was added to give participants freely indicate their other sexual orientations besides males and females The findings showed that there are more females employees than males in South African Academic libraries. None of the participants in the 91 LIS professionals who participated in the Web Survey and Web survey and 12 LIS directors interviewed answered the question about inclusivity, even though it is listed as an option under gender category. It is also important to note that this section was added in response to the 2030 Vision for Gender Equality in the South African National NDP (South African National Development Plan, 2021:28). Additionally, this is an ethical way to advance gender equality and generate more inclusive research results.

6.1.2 Distribution by age of participants

Historically, LIS professionals in academic libraries in the higher education institutions were mostly dominated by older generation than younger generation. According to Ayaz and Yanartaş (2020), Performance expectancy (PE) denotes the LIS professional's beliefs whether use of the next-generation ILS will enhance their technological skills and experience (Aytekin, Özköse & Ayaz, 2022). However, Momani (2020) stated that gender, age, the voluntariness of use, and experience variables may differ on social influence (SI). The findings show that a sizeable portion of 46% of LIS directors interviewed in the semi-structured interviews are between the ages of 55-64, whereas in the web-survey 18% of LIS professionals between the ages of 55 and 64. There were no participants over 64 in both datasets This shows that most LIS directors are older than 55 and plan to retire within the next five years

Thirty-one (31%) of LIS professionals are between the ages of 35-44, 45-54, 13% of the participants are between the ages of 25-34 and only one percent of LIS professionals is between the ages of 18-24. The LIS directors are 20% aged 41-50, 17% are the ages of between 31-40. They were no participants in the interviews conducted by LIS directors for less than 31 years. It is important to note that two participants respondents from the interviews preferred not to reply or disclose their age. This shows that that young professionals are still entering the field of (LIS).

Eventually, the findings from the web-based survey and the semi-structures interviews when mixed with literature explored in the study points to LIS professionals in South Africa are lacking technological skills because older generation are reluctant to adopt to latest technologies than their young counterparts.

6.1.3 Distribution by qualifications of participants

Historically, the qualifications and the role of LIS professionals have been consistently questioned. Higher Education Qualification Framework (HEQSF), which was introduced in 2014 by the Council of Higher Education, introduced new qualification names, new qualification types, new minimal admission standards, new NQF levels, and new progression pathways (Council of Higher Education, 2014).

In terms of this study, all twelve LIS professionals surveyed a combined 46% of have a degree, there were no LIS directors' interviews on the level of the degree. Ten (90%) LIS directors who took part in the interviews have a master's degree, and two (9%) of them have a PhD. Twenty-six (29%) of LIS professionals surveyed have a master's in library and information science from traditional or technological universities, with the remaining two percent (9%) having a PhD. This is an indication that academic libraries in South Africa have employed qualified library staff as paraprofessionals (staff with either a university diploma or a degree) and professionals (with a minimum of a master's degree) to manage library function.

Furthermore, five (5%) LIS professionals have matric and three (3%) have a diploma. Three LIS directors with master's degrees indicated that they have enrolled for a PhD to improve their qualifications. On the other hand, two (2%) who selected others indicated that they have other specialized qualifications in the IT field and are employed in the library IT department. It is important to note that only 81 of the 91 LIS professionals survey respondent to this survey. This indicates that most LIS professionals need to improve on their qualifications in their field and there is still a shortage of IT and technology staff in academic libraries in the Public Universities in South Africa.

6.1.4 Organizational Affiliation

The results indicate that only 87 out of 91 LIS professionals surveyed from seventeen public universities participated in the study, and only twelve LIS directors from ten public universities participated in this study. The findings from LIS professionals surveyed show that CPUT received the highest responds of 46% while UCT and UWC both received 7%, followed by UJ, and UCT at 5%. NWU, DUT, and WUSU received the lowest response rate of 3% followed by UNISA, VUT, MUT, and UKZN while SPU, UNIVEN and SPU received the response rate of only one percent. On the other hand, UNISA had the highest participation in the online interviews study, with 27% of LIS directors interviewed. Other institutions, including CUT, DUT, NMU, UCT, UKZN, UL, UNIVEN, and WITS, each contributed 9% of the participants. The findings show that there was a lack of support and participation of LIS directors which led to the lowest response from LIS directors. Some directors indicated that they were unable to participate because of operational reasons and staff shortages. The other

factors that contributed to the lack of participation in the study were the delay of the ethical and staff capacity.

6.1.5 Distribution by departments

According to the study, there are more employees working in the user/client services department than in other departments such as IT and technical services. The remaining employees who indicated they work in other departments specialize in fields such as research, marketing, quality assurance, institutional repositories, and other fields.

6.1.6 Distribution by role in the organization

Most LIS directors (83%) in South African academic institutions are senior managers, with 27% in executive roles. These roles influence their pay, which varies due to differing organizational structures. Among LIS professionals surveyed, 8% are senior managers, 35% are middle managers, and 57% hold multiple roles. This indicates that there is still a gap in staff occupying senior management positions in academic libraries. Most libraries are restructuring or re-aligning their library strategic plans to create more responsible positions on professional levels and maximizing administrative staff. This is a requirement for all libraries in academic institutions to respond to the 2030 vision institutional goals and support the sustainable development goals (SDG's) as transformative pillars for Agenda 2030 in South African higher education institutions.

6.1.7 Distribution by years of experience

The results indicate that over 40% of LIS directors interviewed and LIS professionals surveyed have between seven to ten years' experience in their organization. The findings also indicated previously on (section 6.1.2) that most LIS directors will be retiring in the next five years, which indicates that academic libraries need to implement succession planning and skill transfer within to capacitating staff to be competent to grow and develop in their roles for occupying these future positions. Less than half 33% of LIS directors interviewed and 41% of LIS professionals have experience of four to six years. This shows that there is an improvement in LIS professionals entering new positions in academic libraries. Furthermore,

twenty (20%) of LIS professionals have one to three years' experience and there were no LIS directors in this category.

Finally, four (4%) of LIS professionals have been in their position for under a year while 25% of LIS directors have been in the company for less than a year. The results show that there has been a movement of replacing senior and executive management staff exiting their positions due to retirement.

6.2 Background of LIS Directors

6.2.1 Qualifications of Employees

There is a total of 677 (54%) qualified staff with library and information science (LIS) qualifications across ten libraries, according to the LIS directors' interviews, while 540 (46%) are non-professional staff (without library qualifications). This indicates that more than half of the staff are qualified in the field of LIS while the remaining participants need to improve their studies, especially in the IT and technical fields.

Top- level management has a significant impact on change management in academic institutions by making sure that they inspire and encourage their staff to adopt the newest trends and technologies in their libraries for learning, research, open scholarship, and academic support. To effectively manage change in academic libraries, library leadership must be knowledgeable about the best procedures for systematically modifying the operations of the entire organization. Current and future leaders of libraries must improve their ability to manage change if they are to succeed in a VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) world (Association of College and Research Libraries, 2020). This is a sign that academic libraries in South Africa are on par with their counterparts in terms of current trends and are developing the skills needed to effectively carry out their responsibilities because of digital transformation (Shastri and Chudasma, 2022). This will enable them to respond to the disruptive change of technologies in the 4th Industrial era and effectively deliver Library 4.0 services to their users.

In terms of staff training in management and use of the next generation ILS in academic libraries, two LIS directors who responded to this interview indicated that staff need to upskill

themselves with IT and technical skills and keep themselves updated with the disruptive technologies like the Fourth Industrial Revolution. They further stated that more staff members are improving their qualifications and are enrolled in master's and master's and doctoral degrees in Library and Information Science. This agrees with the findings of Sibiya and Ngulube (2023), who examined how employers in South Africa perceived graduates' expertise in libraries and information science and their knowledge of digital scholarship.

6.2.2 Staff complement

This question was only directed at the LIS directors regarding their involvement in the library strategic plan. In the next five to ten years, the staff complements will be impacted by factors like change management, staff retention, staff training, and remote working, according to the responses.

To ascertain factors that will impact the adoption and maintenance of the next generation ILS on staff complement in the next five to ten years in academic libraries. Only the LIS directors were asked to identify those factors because of their role in talent management and their influence on the adoption and maintenance of the next generation ILS to attract and retain talented staff . The findings indicate that in the next five to ten years, staff complements will be impacted by factors like change in management, staff retention, staff training, and remote work, according to the responses of the twelve LIS directors interviewed. In determining the changing role of academic librarianship and staff retention in the next five to ten years, three

LIS directors indicated that they have insufficient qualified staff in the IT department and that most staff members are nearing retirement. They further stated that the changing traditional role of the library in rendering services like cataloguing is currently changing and has been replaced by new roles like Metadata Librarians to be in line with the current trends of the library academic environment. This confirms the assertation of ACRL (Association of College and Research Libraries, 2020) and Ashiq (2021) as well as Bajpai and Madhusudun (2019) that traditionally academic librarians have been facilitators, connecting users and the information they require for their academic needs, emerging staff positions include scholarly communication, digital projects, user experience, technical support, digital humanities, and learning commons. The lack of staff retention in academic libraries in South Africa is contrary to existing literature where several researchers have shown how academic libraries have been

able to integrate their skills and training development plan with succession planning, staff retention, and skills transfer from LIS professional who is about to exit their profession to the young generation entering the profession.

Furthermore, five LIS directors emphasized that top-level management has a significant power to influence change management in academic institutions by making sure that they inspire and encourage their staff to adopt the newest trends and technologies in their libraries for learning, research, open scholarship, and academic support. The findings revealed that all 12 LIS directors agreed that leadership and change management are crucial in libraries, while 98% of LIS professional need leadership skills. Furthermore, 97% agreed that change management skills are required by LIS professional managing libraries and system. Therefore, to effectively manage change in academic libraries, library leadership must be knowledgeable about the best procedures for systematically modifying the operations of the entire organization. Current and future leaders of libraries must improve their ability to manage change if they are to succeed in a VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) world (Association of College and Research Libraries, 2020). This will enable them to respond to the disruptive change of technologies in the 4th Industrial era and effectively deliver Library 4.0 services to their users.

In terms of staff training in the management and use of the next generation ILS in academic libraries, two LIS directors who responded to this interview indicated that staff need to upskill themselves with IT and technical skills and keep themselves updated with the disruptive technologies like the Fourth Industrial Revolution. They further stated that more staff members are improving their qualifications and are enrolled in master's and master's and doctoral degrees in Library and Information Science. Ninety percent LIS directors have a master's degree, while 29% of LIS professionals have a master's degree in library and information science. Nine (9%) of LIS professionals and LIS directors have a PhD. This agrees with the findings of Sibiya and Ngulube (2023), who examined how employers in South Africa perceived graduates' expertise in libraries and information science and their knowledge of digital scholarship

The finding also show that 99% LIS directors interviewed, said that IT (Information Technology skills were required, while only 1% indicated that they are not required, 93% of

This is a sign that academic libraries in South Africa are on par with their counterparts in terms of current trends and are developing the skills and qualifications needed to effectively carry out their responsibilities because of digital transformation (Shastri and Chudasma, 2022). Top level management has a significant impact on change management in academic institutions by making sure that they inspire and encourage their staff to adopt the newest trends and technologies in their libraries for learning, research, open scholarship, and academic support. To effectively manage change in academic libraries, library leadership must be knowledgeable about the best procedures for systematically modifying the operations of the entire organization.

6.3 Summary of the findings

In this section, the research findings are summarized according to the research objectives. Firstly, the researcher explored the nature and extent of the adoption and maintenance of the next generation library integrated library systems (ILS) in literature. Next generation ILSs are a grey in literature as expects have not agreed on a definition for this concept. However, literature concisely refers to next generation ILS as new management system which makes use of developing technologies to manage current workflows and extended access to collections (Grammeris & Mourikis, 2020; Katariya,2023). Because both LPSs (Library Services Platforms) and the next generation ILSs (Integrated Library Systems) are frequently used in library literature and libraries. Ocloo and King(2022) defines LSP in terms of web-based solutions that facilitate the management of several services via a single system. These services include physical, digital and electronic capabilities. Kouis and Agiorgitis (2022) suggest using the next generation ILSs for the new emerging systems to emphasize their integration feature and prevent any confusion it may cause in describing next generation ILS and LSP that emerged during the 3rd generation on library information systems. Literature underscores technology as a supporting mechanism to enable integrating new technologies into library systems.

Secondly, the skill and competencies of LIS professionals were explored and probed through reviewed literature, findings from the web-based survey and the semi-structured interviews. The analysis and interpretations of data revealed that LIS professionals in academic libraries

in South African were lacking in technical and technological skills in relation to adapting to new technologies in the digital environment.

Thirdly, the data privacy and security knowledge and awareness by LIS professionals using next generation ILS to manage and provide access to information resources when engaging in a cloud-based environment were also probed and explored through reviewed literature, findings from the web-based survey and semi-structured interviews. This finding demonstrates that LIS professionals in South African academic libraries continue to be ignorant and unaware of data security and privacy measures in their institutions to prevent security breaches or cyber security.

Lastly, LIS directors in academic libraries in South Africa were probed in the interviews since the findings from the web-based survey provided contradictory evidence. The empirical overall analysis from the multiple linear regression, inferential and descriptive statistics varied in the technological skills, data and security (Cybersecurity) relate to LIS professionals in academic libraries in South Africa. However, after closer examination on the descriptive statistics and the semi-structured interviews the data pointed to a lack of technical and technological skills of LIS professionals in using and managing next generation ILS in the digital environment. As a result, the philosophical underpinning of pragmatism and MMR approach was justified in the study as the questionable issues in the empirical evidence from the web-based survey was clarified through the findings of the same structured interviews.in academic libraries in South Africa.

Additionally, the semi-structured interviews also permitted LIS professionals to voice their opinions and provide solutions to the research problem. LIS professionals expressed their concerns, indicating that a module needed to be introduced in LIS schools in South Africa. The LIS curriculum should have a concise understanding of Library Database Management Systems (DBMS) in context of contemporary library settings in the management of digital and information resources in the digital environment. Therefore, these will assist LIS professionals in future development of next generation ILS. Furthermore, the development of a decision-making model for adoption and maintenance, particularly for LIS professionals who are currently using or managing library systems and who need to enhance their ICT and technical

skills. The growth of data privacy and security necessities constant care protecting user sensitive information in the use of next generation ILS.

6.4 Discussion of findings

6.4.1 [RQ1] Adoption and maintenance of the next generation IL by LIS professionals

Library IT support staff to execute Library IT mandate

The next generation ILS's adoption and maintenance form an overlapping UTAUT model component. Performance expectancy, effort expectancy, social influence, and facilitating conditions are the four components of UTAUT. As a result of these four variables working together to enhance the adoption and maintenance of next-generation ILS, the full essence of UTAUT is realized. The other aspect of UTAUT concern itself with effort expectancy (EE) which is concerned with issues of the system's ease to use, complexity, and the "degree to which individuals believe that the system helps to improve job performance (Vialle et.al., 2019:4; Momani, 2020:84). EE represents the LIS professional in academic libraries concerned with beliefs regarding easy to use of the next-generation ILS.

For the respondents to determine whether they have sufficient staff to execute the library IT mandate, they were asked if they agree or disagree. This item received responses only from 11 out of twelve LIS directors. This question was posed only to the LIS directors to determine if there is sufficient library IT support staff to execute library IT mandate. The results reveal that 4 (36%) disagreed, while 7 (64%) disagreed. The respondents who disagreed were given the opportunity to provide their reasons. The analyzed results show that the majority 7 (58%) indicated that the primary reason for the staffing shortage in library IT departments is lack of IT training and expertise. Breeding (2019), state that the "key objective around integrating technology to improve the work is grounded in an in-depth understanding of all the library strategy and operations, on knowledge of the technologies that exist, and technical skills to shape technology around the needs of the library.

Three themes were further identified, these themes included library restructuring, remote work and staff training. More than half (58%) of the LIS directors interviewed revealed that the primary reason for the staffing shortage in library IT departments is lack of IT training and

expertise and there is also a lack of staff retention and succession planning in the library departments. Due to digital transformation, LIS professionals need to develop the necessary skills to carry out their responsibilities effectively (Shastri & Chudasma, 2022). The impact of COVID-19 had a drastic impact on the educational sector globally. Learning, teaching and research and open scholarship process continue to experience disruptive technologies. In response to the disruption of technology and changing environment of learning, teaching, and research, five (41%) stated that their libraries are going through processes restructuring in their libraries to align themselves with 4th industrial skill to render Library 4.0 services to their patrons. These finding echoes the statement by Chisita (2021) that libraries should look at the current trends in the library and academic environment, future skills requirements as to develop proper training programmes for librarians and review the job descriptions in line with the changes.

Two respondents (14%) indicated that remote work adds advantages for libraries to fulfil their IT mandate and indicated that they need a business continuity plan and a policy allowing IT and support staff to work from home. This adds value concept of Shastri and Chudasma (2022) which state that to take advantage of 'uncertain' technologies during the pandemic situation, library professionals and their users should update themselves as per technological innovation and learn to easily adapt to newest technologies.

Moreover, literature constantly highlights the absence of technological knowledge in academic libraries (Ngozi, 2020). The findings when mixed with the literature explored in the study points that librarian in academic libraries in South Africa are lacking information technology qualifications. Shastri and Chudasma (2022) suggest that additional training for LIS professionals should include librarianship courses such as MARC, Web design, and the Digital Library.

Types of the next generation integrated library systems (ILS)

Next generation ILS is a complex concept. Both the questionnaires to LIS professionals and LIS directors contained a question on types of ILS currently used by libraries the adoption and maintenance of next generation ILS. The findings indicate that there is no clear understanding of the concept of next generation ILS which emerged from the findings of the study. Fifty-eight (58%) of the 91 LIS professionals in the Web survey revealed that the majority (58%)

respondents are using ALMA (Ex-Libris), thirty-one (31%) are using Sierra (Innovation), four (4%) respondents are using Open Library Foundation's (Folio), and one (1%) respondent are using World Share (OCLC) are among the brands used.

Response from LIS directors reveal that a majority of seven (57%) respondents are using Sierra (Innovation), four (4%) respondents are using Open Library Foundation's (Folio), one (1%) respondent are using ALMA (Ex-Libris), and one (1%) respondent are using World Share (OCLC) are among the brands used (OCLC) are among the brands used. The one director who indicated are still using traditional LIS Siera (Innovation) mentioned that they are still using older version and had not yet migrated to the new Sierra that is more cloud-based. The findings show that ALMA, followed by Sierra has received the highest number of adoptions according to several participants.

It is evident from the result that ALMA and Sierra are the most popular brands in South Africa used by LIS professionals. The adoption of next generation ILS in South African academic libraries validates the claims made in the literature by researchers such as Ngozi, (2020) and Muniraja (2021) that libraries use next generation ILS to automate routine activities. These findings most South African libraries have already migrated to the next generation ILS and only one LIS directors' interview who was still new in the position claimed that they have not yet migrated to a new system and currently evaluating and benchmarking with other university libraries to select the best system for management of their library systems. Grammeris and Mourikis (2020) stated that even though new system purchases lead to the selection of the library services platform, with Ex-Libris ALMA currently enjoying significant popularity, most libraries continue to use traditional integrated library systems.

Traditional ILS used by LIS professional prior to adoption of the next generation ILS

Prior to the adoption of the next generation ILS, libraries used traditional integrated library systems (ILSs) which were mostly designed to manage print resources. Seventy-five (75%) of LIS professionals previously used), one Sierra Millenium (8%), one (1%) used Polaris (Innovative). The other 2 (16%) who selected another used Symphony and Sisri Dyne. In the interviews conducted with LIS directors seventy-five (75%) using Millennium Sierra System was the most preferred system used by LIS directors. Of the other LIS directors, eight (8%) said they used ALEPH. The other fifteen (15%) of LIS directors who selected other said that

before migrating to the new ILS, they had previously used traditional ILS such as Symphony and Sirsi Dynix According to the literature, previous traditional integrated library systems (ILS) have become obsolete because they were previously designed to manage print resources It important to know that one of the libraries directors mentioned that they are still using traditional ILS and not yet migrated to the new system. These reasons refer to the consensus that library employees were dissatisfied with the current state of (ILS) products due to traditional library systems' lack of flexibility, inability to handle electronic information, and user experience that does not meet contemporary web expectations (Sanaullah & Uddin, 2020).

Factors considered before adopting the next generation ILS

The next generation ILS's adoption and maintenance form an overlapping UTAUT model component. One of the factors in this model is performance expectancy (PE) which is regarded as the degree of belief that the individual using the system will perform better. PE denotes the LIS professional's beliefs whether use of the next-generation ILS will enhance their technological skills and experience (Aytekin et al., 2022:80). In terms of factors to be considered by LIS professionals before the adoption of next generation ILS to manage their information resources were divided into three themes. These themes included technological Factors (e.g. System Quality, Information quality), Librarians factors (Computer Self Efficiency and Librarians' Experience), and Organizational Factors: Top Level Management Support and User Training.

The results from a survey of 91 LIS professionals were used to determine the factors that should be considered before adopting the next generation of ILS in libraries. Librarian factors e.g., librarian experience and computer self-efficiency were highly cited by over half of LIS professionals and fewer by LIS directors. Technological factors were cited by led than a half for qualitative and a very high for quantitative data reflected on the consensus in the literature by Breeding, (2019), Sanaullah and Uddin (2020) regarding the aim of adopting next generation ILS in service delivery. Organizational factors were highly cited by by LIS professionals and lower by LIS directors. This demonstrates that the South African library fraternity is thinking along similar lines to their counterparts in the developed world to offer improved services. It reveals that ILS is a project where resources are set up in the library's framework (Sanaullah & Uddin, 2020). It is important to know that only one of the libraries'

directors mentioned that they are still using traditional ILS and have not yet migrated to the new system. These reasons refer to the consensus that library employees dissatisfied with the current state of (ILS) products due to traditional library systems' lack of flexibility, inability to handle electronic information, and user experience that does not meet contemporary web expectations (Sanaullah & Uddin, 2020).

According to the calculation of Cronbach's Alpha, the internal consistency of qualitative data on technological factors for the adoption of next generation ILS (overall reliability of 0.822 of technological factors indicates that this category of research has a strong association in terms of consistent scoring. Lack of advanced ICT skills among South African academic libraries LIS professionals was widely reported in the literature by Sibiya and Ngulube (2023) and Ngozi, (2020). The lack of technical and ICT skills in academic libraries in South Africa impact the adoption of newer technologies by LIS professional and some libraries are still stuck using traditional systems and lacking behind as compared to their counterparts globally. In this research, it is still of utmost importance to comprehend and establish the environment in which human organizations will adopt information systems

User training qualities considered when considering user training as a factor for the adoption and maintenance of Next-generation integrated library systems (ILSs)

The provision of learning, teaching, and research is one of the primary competencies of librarians and information professionals. In terms of user training qualities considered when considering user training as a factor for the adoption and maintenance of Next-generation ILS were divided into four themes. These themes included trainers' personnel skills and competence, training curriculum, user commitment, and user experience. Less than half of LIS professionals from the web-based survey considered trainers' personnel skills and competence as highly important, followed by training curriculum and user commitments. User experience as an additional factor to be considered. According to the calculation of Cronbach's Alpha, the internal consistency of qualitative data on user training as a training factor for the adoption of next generation ILS (overall reliability of 0.633) indicated that this category of research has a questionable association in terms of consistent scoring. This confirms the assertation of ACRL (Association of College and Research Libraries, 2020) and Ashiq et.al (2021) that traditionally academic librarians have been facilitators, connecting users and the information they require

for their academic needs, emerging staff positions include scholarly communication, digital projects, user experience, data management, technical support, digital humanities, and learning commons. All twelve LIS directors interviewed libraries responded to this item. In the three themes identified on user training qualities, trainers' personnel Skills and competence were highly cited followed by user commitment, training curriculum. Computer self-efficiency was cited low by LIS directors stating that user services staff must be given priority on the training of new systems and platforms and specifically be trained on the functionality of the system that is aligned with their specific job requirements, tasks, processes and workflows.

Purchasing a new software/system requirement

The decision-making process on purchasing a new software/system in academic libraries is crucial and complex due to the numerous data sources, processing, and high volumes of data to be analyzed. To identify critical steps that needed to be followed when implementing newly purchased software/system, seven themes: data security, project management, vendor support, collaboration, system integration, and budgetary needs were identified as theme.

Both LIS professionals surveyed, and LIS interviewed mentioned that staff collaboration is the most important step when purchasing new software. This indicates that acquiring a new system in academic libraries requires greater collaboration, resource sharing and vendor support among libraries. Breeding (2019) emphasized that due to budget cuts in academic libraries because of the global economic and financial crisis LIS professionals are facing problems in acquiring new systems for their libraries. The majority of LIS directors interviewed considered budget requirements as a critical step when purchasing a new system or software, whereas the LIS professionally considered it not important. This is confirmed by Adamu (2021) who emphasizes that implementing a new system is one of the most significant and costly projects to be considered by academic libraries when purchasing a new software or system. Before purchasing any new system of software, system evaluation needs to be conducted by academic libraries to ensure that it is aligned with library strategy and business requirements.

LIS professionals surveyed considered system integration highly critical when purchasing and evaluating a new system, while on the other hand LIS directors interviewed gave a lower response on this item. They further stated that software evaluation should be carried out to

make sure the system satisfies the library's business requirements. Breeding (2019) maintains that due to the expense and difficulty of switching systems, libraries tend to stick with their current systems unless they have a strong vendor or product dissatisfaction, or they believe certain technologies better align with their goals. This will help with testing the system's interoperability with other university platforms

Project management received and data security received an average response for both quantitative and qualitative data. Furthermore, change management receives the lowest data from both participants. Staff training also received an average response from both the participants stating that it is important for staff to have knowledge of current trends a new technology in academic libraries. This overlaps with the components of Siguenza-Guzman framework for economic evaluation of libraries through a holistic approach. This framework was adopted by (Siguenza-Guzman et al., 2014) due to its foundation to propose architecture and an integrated set of tools to holistically assess libraries. Furthermore, the implementation planned to assist library evaluators in gaining a more holistic knowledge of the library system and library administration in being better informed for their decision-making process.

System vendor's method for identifying problems with the current system

This question was directed to LIS professionals who indicated that it was like the previous question, although a pilot project was conducted on 20 October 2021, the question was not identified important during data collection, after the pilot project was conducted. Therefore, the researcher excluded this item in the study, this item might be explored by future researchers as it is crucial for vendor selection processes, risk assessment, contract negotiations, managing performance and many other factors necessary in developing relationships and vendor management.

Failures in the implementation of next-generation ILS

The next generation ILS's adoption and maintenance form an overlapping TAM model component. Libraries face several challenges that must be addressed if librarians are to remain relevant in providing library and information services in the twenty-first century (Kataria, 2023). The main challenge in the study involves understanding why people accept or reject new ICT and the introduction of modern technologies. Furthermore, eight themes created on

the failures in the implementation of next generation ILS included: vendor support, project management, system integration and change management , interdepartmental communication, top-level management involvement, collaboration, and training.

One of the biggest failures in the adoption of the next generation ILS is vendor support, as mentioned earlier in the results, was frequently cited highly by LIS directors who took part in the interviews. The LIS professionals who participated in the web survey also indicated that there is a lack of vendor support and training on newly purchased software or systems. Top-level management involvement, collaboration, and training were less frequently mentioned by LIS directors while LIS professionals considered them highly important. It is important to note that project management is viewed as less important by LIS professionals and more important of LIS directors to prevent failures in the adoption of next-generation ILS.

Another failure in the implementation of the next-generation ILS unidentified by LIS professional surveyed was lack of collaboration stating that some libraries are still operating in silos when coming to the implementation of next-generation ILS instead of collaborating with their sister universities. According to the calculation of Cronbach's Alpha assessed the internal consistency of failures in the implementation of next generation ILS, the overall reliability of 0.888 indicates that this category of research has a good correlation in terms of consistent scoring. The lack of advanced ICT skills among South African academic libraries LIS professionals was widely reported in the literature by Sibiya and Ngulube (2023).

Improvement of the adoption of next generation LIS

LIS professionals surveyed were asked to respond to this question, and they were free to share their opinions on how they believed they could increase the adoption of next-generation ILS in their libraries. Most LIS professionals (27%) agreed that before adopting next-generation ILS, particularly when buying new software, proper staff consultation and communication are always necessary to increase the adoption of next-generation ILS in libraries. However, 16% viewed collaborations with other departments as crucial for the adoption and maintenance of next-generation ILS systems for data sharing and shared systems; 12% of respondents contemplate that it is crucial to perform a system evaluation to ascertain whether a next-generation ILS is operating as anticipated. The evaluation supports project team leaders in collecting user feedback and library staff testimonials. System migration requires vendor

technical support for ongoing support and maintenance, according to 8% of respondents, after the sale of a new system. They further recommended that all academic libraries purchase a unified system for the administration of their library systems to save costs of purchasing news systems.

Shift from traditional library integrated system (ILS) to a next generation integrated (ILS) library system

Transitioning from ILSs to next-generation ILS has evolved through generations of structural changes, such as relational database systems and client-based server systems, towards integrated Web services Balaji et al. (2019). This questionnaire only included LIS directors' interviews to find out what guidance they could offer regarding the migration/shift of a library system from a traditional ILS to a next-generation cloud-based ILS. Change management 50% were cited by half of LIS directors as key elements to consider when shifting from a traditional to a cloud-based system; 25% cited system evaluation; system integration, budget, staff involvement, and data security as being among the least significant considerations by 16% of LIS directors interviewed. Adamu (2022) emphasizes that without fully deploying and implementing the previous system, most university libraries have shifted from one integrated library system to another.

Library 4.0 service delivery

This questionnaire only included LIS directors' interviews to find out how their institutions from an executive management standpoint may assist their libraries in successfully providing Library 4.0 services. The main factor was budgetary considerations 50% (of 6 responses), and strategic alignment, which is represented by 33% of the responses. Change management, system integration received and training each received 16% of the responses, while top-level management support and system evaluation received less citation. Library management needs to reconsider their strategy to take advantage of the novel opportunities provided by Library 4.0 tools by embracing the use of AI, big data analytics, and blockchain, developing countries libraries can catch up to developed countries and profit from the 4IR's opportunities (Nkiko & Okuonghae, 2021). Through the help of cloud computing and internet access, libraries can provide 24/7 hybrid access to both on- and off-campus information resources. The researcher

might therefore draw the conclusion that the LIS directors have not investigated the use of Library 4.0 tools in more detail to ascertain what factors contribute to their success.

Significant problems in the adoption of next generation ILS

Both the questionnaires to LIS professionals contained a question on challenges encountered with the adoption and maintenance of next generation ILS. This item received 91 responses from participants. Fifty-eight (64%) of the respondents reported having difficulties adopting and maintaining the next-generation ILS in their libraries, while 33 (36%) reported having no such difficulties. The analyzed data analyzed reveals that the majority (31%) are experiencing technical problems with the system because of a lack of staff training. Nineteen mention they have problems with login and passwords because of the lack of system integration with another system. Because the system is hosted in the cloud and could potentially be hacked, data security was seen as being at high risk. System compatibility is a problem, according to respondents (19%). Six percent of respondents cited change management as a challenge, and six percent mentioned vendor support and training.

Lack of system integration was identified by the analysed qualitative data (58%; 7 responses). To ensure that staff are trained in more IT and technical skills for the implementation and maintenance of the next generation ILS, LIS directors identified training and development of staff (16%) as a critical factor. The researcher acknowledges in the literature that the South African LIS labour market will have "new job titles" available. These newly created positions "represent strong ICT elements and show the influence of CTS on knowledge and skill requirements in the library sector" (Raju, 2020).

6.4.2 [RQ2] Requirements to determine competencies among LIS professionals for their involvement in the adoption and maintenance of the next generation ILS

Section 6.2 concretises requirements that determine library and information science (LIS) competencies among LIS professions. Questionnaires were administered among LIS directors and LIS professionals and consisted of professional competencies namely: generic skills; managerial skills, professional skills, technical skills, and Library 4.0 skills.

Generic skills

Respondents were asked to select the generic skills that are required or not for the adoption and maintenance of next-generation ILS in their libraries to conduct quantitative and qualitative research. According to the results for LIS professionals, 97% of them indicated that flexibility, adaptability, and the ability to communicate with customers were necessary skills. 94% of respondents said they needed good problem-solving skills, while 91% said they needed good decision-making and analytical skills. A need for interpersonal skills (89%), assertiveness skills (83%), and time management skills (83%); a need for stress management (80%); a need for interpersonal skills (78%); and a need for creativity (77%).

LIS professionals' results show that 23% of respondents do not require creativity or presentation skills, 21% do not require stress management skills, and 17% do not require stress management skills. 11% of jobs do not require people skills; 9% do not require analytical or assertive skills, and 6% do not require problem-solving abilities. The remaining 3 percent are capable of functioning without communication, adaptability, customer relationships, or flexibility.

Interviews with LIS directors reflected that the total number of 93% indicated that generic skills are required for LIS professionals to adopt and maintain next-generation ILS in their libraries, while 10% said they were not.

The overall findings on generic skills needed by LIS professionals who were surveyed, 90% of them are needed while 10% said they were not. Generic skills are sought to be the most listed skills in job advertisement for LIS professionals (Yadav, 2022). LIS professionals need to possess core skills such as presentation and information literacy course design skills, reference, and research skills, including information and search retrieval skills (Sibiya and Ngulube, 2023; Bajpai and Madhusudhan 2019). This study is under the assumptions that the most frequently listed generic skills in job postings for LIS professionals in South Africa are communication, adaptability, and customer relations skills.

Managerial skills

The results revealed that 99% of LIS professionals and 100% of LIS directors on the managerial skills needed to adopt and maintain the next ILS in their libraries, required resources management skills; 98% LIS professionals required project management, while required by100% LIS directors; Both LIS directors and LIS professionals 99% required local and global thinking skills; Consumer management skills (user need analysis, information seeking, and behaviour) were required by 95% of LIS professionals, but by 100% of LIS directors. Team building was required 100% by LIS director, and 93% required by LIS professionals; 97% of LIS professional required leadership, planning, and organizational skills, and 100% required by LIS directors.

Academic libraries need leaders who are self-driven, talented, and effective communicators as well as traditional skills and qualities to survive in the future (Aslam, 2018). The mission, goals, and objectives of the organization must be incorporated into any change for libraries to succeed. A change in the organization's culture will result from simultaneous changes to its structures, systems, and workforce (Amaechi, 2018). Managing change skills was 100% of LIS directors and 99% of LIS professionals. This corroborates the findings of Benedetti (2020) that to effectively manage change, academic library leadership must apply best practices for methodically adjusting work to the entire organization (Benedetti et al., 2020).

Apart from the purchase of software, library systems, books, journals, and databases, the funds provided to libraries are used for a variety of other purposes (Otike & Barát, 2021), this study reveal that 100% of LIS directors and 84% of LIS staff members require knowledge of finance management. To effectively provide services to library users, most academic libraries rely on their parent company for funding and support, 91% of LIS directors and 92% of LIS professionals agree that LIS directors need to be skilled negotiators to make purchases for next-generation ILS.

For LIS professionals, 6% finance and management skills were not, followed by negotiation skills by 8% of respondents, team building by 7% of respondents, and consumer management skills were not by 5% of respondents; 3% of respondents said they did not think leadership, planning, or organizational skills were skills required; and only 1% said they did not think skills in local and global thinking, change management, or resource management were necessary. The finding on managerial skills for LIS directors reveals that onlyb1 participant (8%) indicated that resource management is a skill that is not necessary, however all other 11 participants did not indicate any of the other skills listed as required, while. Overall conclusions show that managerial skills are needed by LIS professionals in a total of 95% of instances, while they are not needed in 5% of instances. The results of the LIS directors' interviews, on the other hand, show that 99% of all managerial skills are required for the adoption and maintenance of the next generation ILS in their libraries, while 8% are not. The two data sets gathered ranked managing change and thinking locally and globally as highly valued skills. As most developing nations are taking the initiative and managing change in academic libraries to share best practices for carefully adapting their work to the needs of the entire organization, this is a sign that academic libraries in South Africa are advancing in terms of current trends (Benedetti et al., 2020).

Professional Skills

This study found that core professionals are needed by LIS professionals to support learning, teaching, and research. The following professionals' skills were either required or not required by LIS professionals and directors.

Information technology skills

The decline of professionally trained and unskilled staff is one of the major challenges the libraries are currently facing; the level of short staffing is evident and those on the ground have little or no computer knowledge (Breeding, 2019). In determining whether IT skills are required for the adoption and maintenance of next-generation ILS in their libraries. The findings reveal that 99% of LIS professionals and 100% of LIS directors required knowledge of the Internet. Given the wealth of information resources available online, academic libraries are required to defend their role and existence in universities (Otike & Barat, 2021).

The results revealed that 91% of LIS professionals and 98% of LIS directors said they needed knowledge of networking, hardware, and software; 97% of respondents said that library automation was required, and 100% of LIS directors agreed; 90% said that intranet proficiency was required, and 100% of LIS directors agreed; 90% said that presentation software, specifically PowerPoint, was required; 88% said that LIS professionals needed to be familiar with MS-Suite, and 100% of LIS directors agreed. Given the wealth of information resources available online, academic libraries in universities must defend their position and continued existence (Otike & Barat, 2021).

IT skills not required by the two datasets collected included 12% LIS professionals requiring MS-suite as a skill not required; 10% requiring intranet skill and presentation software, such as 10% LIS professional PowerPoint presentation; 7% of not requiring hardware/software skills and networking skills; 3% requiring library automation skill not required; 2%; and 1% respondents considering Internet not a skill not required. Only one director of LIS indicated that networking and hardware/software skills were required.

The overall results for LIS professionals show that 93% of LIS professionals' skills in information technology (IT) are required, while 7% are not. IT skills are required, according to 99% of the LIS directors interviewed, while only 1% disagreed. The lack of IT staff and technical expertise revealed by the qualitative and quantitative data has proven that without these skills the effective adoption and maintenance of next generation ILS will not be successful in academic libraries. None of the eleven libraries in the LIS interviews selected library automation, Internet, Intranet, networking skills, MS-suite, presentation (e.g., PowerPoint) as skills not required for the adoption and maintenance of the next generation ILS.

Technical Skills

Technical services staff, including systems librarians and technical staff members like metadata librarians, information resources librarians, and cataloguers, are needed for most LIS positions. In terms of technical skills needed for the adoption and maintenance of next-generation ILS in their libraries, this analysis presents the responses of LIS professionals questioned. The current study demonstrates that almost all LIS directors surveyed (99%) and LIS professionals (99%) agreed that knowledge of information resource management was necessary for the adoption and upkeep of next-generation ILS. Academic libraries offer information literacy programs to

help library users develop the necessary digital and information skills. This exposure to cutting-edge technology and the variety of information available in digital formats has made academic libraries a great career option for tech-savvy librarians (Otike & Barat, 2021).

The study revealed that, 93% LIS professionals and 83% LIS directors indicated that Metadata standards (.g., Dublin core, MARC, TEI2 , XML3 etc.) are required; 92% LIS professional and 91% LIS directors indicated that knowledge in library system development is required by system developers and systems librarians; 83% LIS directors indicated that Standards (e.g.,Z39.50) are skills required; 91% LIS directors and 86% LIS professionals indicated that E- serial management.

Technical skills not required by LIS professionals in the adoption and maintenance of next generation ILS who responded to the survey included: metadata standards (.g., Dublin core, MARC, TEI2 , XML3 etc.) by 16% respondents were mentioned as a skill not required; 14% LIS professionals and 8% LIS directors mentioned E- serial management as a skill not required; 8% LIS professionals and 8% LIS director regarded system development as a skill not required; and 1% regarded information resource management as a skill not required. This suggests that additional training for LIS professionals should include librarianship courses such as MARC, Web design, and the Digital Library (Shashtri & Chudasma, 2021). The key objective around applying technology to enhance the work based in the thorough knowledge of all the library strategy and operations, on awareness of available technologies, and on technical skills to shape technology around the needs of the library" (Breeding, 2019). The results reveals that the overall number of technical skills required by LIS professionals are 90%, while not requires are 10%. indicates most all participants 90% of LIS directors interviewed indicated that that technical skills are required while few LIS directors 7% indicated that they are not required to effectively managing the adoption and maintenance of the next generation ILS in their libraries. Employers want LIS professionals with a diverse set of ICT skills and competencies in addition to their core competencies (Bajpai and Madhusudhan,2019). This confirms the assertion of both Sibiya and Ngulube (2023) and Monyane (2019).

Library 4.0 skills

The next generation is cloud-based, replacing traditional ILS. These findings indicate LIS professionals' responses to the library 4.0 skills required/not required in the adoption and

maintenance of next generation ILS in their libraries. Critical thinking and analysis skills were cited high by 99% LIS professionals as skills required, as compared to 91% by LIS directors. Responses on information resources management required by LIS professionals, was cited the highest 100% by LIS directors and 97% LIS professionals. Digital scanning, and preservation was cited high 100% by LIS directors and 88% by LIS professionals. In-depth research skills were cited 91% by LIS directors and 88% by LIS professionals, technology design and programming were cited 91% by LIS directors and 90% by LIS professionals. Emotional intelligent was cited 91% by LIS directors, and83% by LIS professionals. This can be linked with Sibiya and Ngulube (2023) concluding that library staff in the twenty-first century are tasked with a variety of tasks, including content creation and management, knowledge management, digital curation, influencing computer literacy skills, Web design, providing mobile technology services, and media marketing.

Cloud data expansion was highly cited 91% by LIS professionals, and adequately 81% by LIS directors. This finding confirms the assertation Nkiko and Okuonghae (2021) that libraries are currently developing diverse technology in the context of intelligent systems, AI, Robotics, Ma Open Source, Big Data, Cloud Service, and Library 4.0.

The skills not required by LIS professionals, 17% considered emotional intelligence as a skill not required; 14% considered technology design and programming as skills not required; 13% considered in-depth research as a skill not required; 9% respondents selected cloud data expansion as a skill not required; 9% respondents considered digital scanning and preservation as skills not required. Only one (1%) considered critical thinking and analysis as skills not required. The skills not required as indicated by the LIS directors interviewed are, 17% cloud data expansion, while 8% respondents indicated that skills not required are, in-depth research skills, technology design and programming, critical thinking and analysis and emotional intelligence; none of the respondents indicated information resources skills and skills required.

Most participants (93%) of the LIS directors surveyed said they needed to understand Library 4.0, according to the study's overall findings. Only a small percentage of LIS directors (8%), however, said they were not required Library 4.0 skills for the maintenance and adoption of the next-generation ILS effectively and efficiently in their libraries. To keep up with the trends in the academic and research library environment, South Africa is adopting the same mindset

as its counterparts in the developed world by offering effective Library 4.0 skills. Additionally, it shows that the libraries have succeeded in achieving their goals for implementing and maintaining the newest ILS in their collections.

6.4.2 [RQ3] How is privacy and security maintained in the adoption of the next ILS in academic libraries?

The focus of RQ3 was privacy and security. One of the major concerns when considering the risks of using cloud computing is data security; lack of data visibility, poor data control, and other issues are associated with cloud computing implementation (Joshi *et a*l., 2021). When asked to name the person in charge of data security in their organizations, an analysis of respondent feedback illustrated the following: 33% of surveyed LIS professionals indicated that CTS oversee data protection in their institutions; 26% mentioned that data security is overseen by IT managers; 18% mentioned that the data protection officer is responsible for data protection and security, and 16% indicated that the compliance risk officer oversees data security in their organization. The rest of respondents 9% reported that they did not know who the responsible person is in their organization that manages data safety and security. On the other hand, LIS directors interviewed majority of 33% chose CTS, 26% chose compliance and risk officer, 18% chose data protection officer, 16% chose compliance and risk officer, and others indicated that the Governance Committee oversees data protection and security.

Although, Libraries have a long history of upholding patrons' right to privacy as a method of ensuring access to information, freedom of expression, and intellectual liberty (Sudhier & Sienna, 2018). This finding demonstrates that LIS professionals in South African institutions continue to be ignorant and unaware of data security and privacy measures in their institutions to prevent security breaches or cyber security.

Organization's general level of data protection awareness

Participants responded to a request for a description of their organization's overall level of data protection awareness to provide staff with the knowledge necessary to protect your organization's data while performing their duties in accordance with applicable standards, laws, and cyber security best practices. They reported major awareness campaigns for Security training awareness where 50% of LIS professionals indicated the use of YouTube training

videos sent to staff via email, The escalation of reminders to next level of reporting occurred if compliance failed.

While several respondents (33%) cited cyber training awareness as important, others (16%) selected staff awareness of e-mail misuse staff awareness (16%) indicating they occasionally received training awareness on email ethics in their institutions. Respondents (16%) who selected the social media staff awareness category indicated they became aware of how to identify fake news and the use of social media in the organizations. It is worth noting that (3%) of respondents were unaware of their organization's overall level of data protection awareness.

Of the LIS directors interviewed, 50% stated that security awareness and data security are high risks. Risk officers managed cyber security awareness in collaboration with CTS. Regarding cybersecurity awareness, 33% revealed that staff attend training sessions, workshops, and webinars to be instructed on data protection and security. CTS department authenticates every email before it is received or sent by staff to monitor and investigate fishing, according to 33% (4 responses).

This is consistent with the findings of Nicolas-Rocca & Burkhard (2019), who stated that cybersecurity is an asymmetric challenge, requiring resources to defend against attacks from lesser resources.

University written policies on data protection and security

This questionnaire included only LIS professional. Participants were asked to indicate whether the university has written data protection and security policies. For LIS professionals to choose the appropriate policy for their institutions, five options were provided: privacy, data protection, email, internet use, and other policies. According to the findings, a sizeable number of respondents (21%) selected privacy policy, (20%) selected Internet use policy, (20%) selected Intellectual Property policy, (19%) selected E-mail policy, while (18%), One (1%) selected other mentioned that their institutions had already implemented the POPIA (Protection of Personal Information Act).

The findings show that, despite the South African government's introduction of POPIA 2013, organizations, including academic institutions, were slow to adopt the Act's implementation.

Nicolas-Rocca and Burkhard (2019) confirm that the need to adjust library privacy practice in response to network environment challenges has previously been noted as a profession we have been slow to adapt. This is consistent with the Personal Information Protection Act of 2013 (POPIA, 2021), which states that researchers and scholars must be familiar with current legislation requirements for data collection, which include more than just their own Personal Information Protection Act. The act started the enforcement of the POPI Act and PAIA through the Information Regulator, which requires every public or private entity to register an information officer by March 31, 2021).

Steps in Data and Network Security used to assist in maintaining data security compliance

This questionnaire included both qualitative and quantitative data. LIS directors interviewed, mentioned that an organization must make sure that employees have access to information that is pertinent to their jobs. They very frequently (33%) mentioned the management of user privileges. In their responses, they cited that it is one of the common causes of data breaches, along with software updates pending installation. The most common reason given by another 33% believed it was crucial for staff to comprehend their role in the security procedures of their organization. The provision of user training accompanied by increased awareness of responsibilities, demonstrated what could support the prevention of data breaches.

For quantitative data, participants were given options to select whether their organizations employ systems for data and network security to help LIS professionals maintain data security and compliance namely: use a strong, unique password and never share it; do not install unapproved software; do not install unapproved software; think before opening email attachments; lock down your computer when away from your desk during the day; lock down your computer when away from your desk during the day and schedule an antivirus scan for your computer with CTS/IT department. There were 91 responses to this item. Most participants, 20% who said that the best action needed by LIS professionals to maintain data security and compliance is to use a strong, unique password and never share it. Do not install unapproved software, according to 18% responses. Think before opening email attachments, 64 indicated. When leaving for the day, turn off your computer, as stated by 17% of respondents. Lock down your computer when away from your desk during the day, as indicated by 16% respondents, while 15% respondents said that their institution's "schedule an antivirus

scan for your computer with CTS/IT department" 15% was a better method for ensuring data and network security that they could use to help LIS professionals maintain data security and compliance.

This indicates that organizations must be aware of the risks they face before putting security measures in place. Thus, libraries are adhering to the proposal made by Khan (2021) that data security is more crucial than system security because a secured system with corrupt data is useless. This will enable academic libraries. to give priority to the biggest threats and ensures that the responses are appropriate, they claimed that remote workers pose security risks and lack the same level of physical network security as employees who work in an office.

Data and network security employed to assist LIS professionals in maintaining data security and compliance

This questionnaire included only qualitative data. Because of disruptive economic and budgetary constraints, the use of open and free software poses a threat to security resources and privacy information, such as freely available software used by libraries for digitization of material and patron information (Khan *et al*., 2021). In response to request and indicate whether respondents to the questionnaire have systems in place in their institutions to data and network security do they employ to assist LIS directors in maintaining data security and compliance.

Findings for LIS directors revealed data sharing accounted for 58% (7 respondents) of the factors affecting data privacy and security in libraries. The participants mentioned that they adhere to POPIA Act and vigilant about the access rights that are granted to different levels of academic staff and researchers to different levels of data sharing. The importance of configuring the system so that unnecessary functionalities are immediately disabled when known vulnerabilities exist is highlighted by the cited 42% (5 respondents). From the response it seems that staff are of data security systems used by their organization to prevent data bridges by using firewalls and ensuring that login are password protected. Staff awareness and training accounted for 25% of the 25 respondents. Surprisingly, risk management was mentioned by one respondent (8%) more than one might expect, as it is essential for organizations to demand updates or additions to cybersecurity policies in the event of system violations and risk management promotes cybersecurity awareness. It can be therefore concluded that library staff in academic libraries in South Africa are making use of available systems in place in their

institutions to data and network security they employ to assist LIS professionals in maintaining data security and compliance.

6.4.4 [RQ4] Development of models for the adoption of and maintenance of the next generation ILS in academic libraries

Research question 4 (RQ4) focused on the nature of a proposed model for the adoption and maintenance of the next generation library ILS. On the preexisting theories that were previously mentioned in chapter two of the study, the research model was developed. The purpose of this study was to explore the development of a decision-making model for the adoption and maintenance of next generation in ILS in academic libraries in South Africa. The Siguenza-Guzman framework was adopted in 2014 (Siguenza-Guzman *et al*., 2014) due to its foundation to propose architecture and an integrated set of tools to holistically assess libraries; this framework was implemented to assist library evaluators in gaining a more holistic knowledge of the library system and library administration in being better informed for their decision-making process.

6.5 UTAUT Factors Effective for the Adoption of the Next generation LIS

Except for UTAUT factors, 23 distinct factors have been identified as indicators of next generation ILS adoption. The factors, however, shared similarities. Specifically, it proposed 23-factors from six drivers, identified as indicators, confirmed their reliability and validity as well as goodness of fit, and evaluated the framework using coefficients generated from Cronbach Alpha. In total six factors were supported from (0.06 >0.09) with their factors differing from their statistical coefficients ranging from excellent, good, acceptable, questionable, poor, and not acceptable. The importance in these studies in the adoption and maintenance of the next generation ILS was revealed (see more detail discussion Chapter 5 section?). The list of factors and their classification using equivalent terms are displayed in Table 6-2. The elements are categorized into 6 main categories. The result of each independent factor is discussed below:

Table 6-1 Grouping Factors

Main Factors	Description	Factors	Framework

Behavioural factors	Sensory responses of end users to next generation ILS	Behavioural intension, use behaviour, Attitude, Intension to use, Adoption, User training	TAM
Technological factors	IT infrastructure, software, and applications	System Quality, Information quality, and After Sale Quality	Siguenza-Guzman framework, UTAUT
Social factors	Librarians' factors affecting the adoption of next-generation ILS	Computer Self Efficiency and Librarians Experience, Voluntariness of use, Anxiety, Perceived ease of use,	UTAUT, TAM
Organizational factors	Organisational Factors affecting the adoption of next-generation ILS	Top Level Management Support, User Training	UTAUT
Trust factors	Trust in the use of next generation ILS and services	Trust perceived security, Reliability, Trust expectancy, Perceived trust	Gardner Hype
Financial factors	Next generation ILS or service provider cost	Affordability, Vendor support	Siguenza-Guzman framework

H1 Performance Expectancy (PE)

The findings indicate that the other most determinant of behavioural intension is Performance Expectancy (PE). Aytekin et al., (2022:80) state that PE denotes the LIS professional's beliefs whether use of the next-generation ILS will enhance their technological skills and experience. LIS professionals believe that if they use the next generation ILS as their library management system, they can be more efficient in performing their task than their previous traditional systems. In addition, technological factors (i.e., system quality, information quality and aftersales quality) are important in system evaluation conducted before purchasing or implementing a new system. It is seen that the most principal factors affecting intension to use in the model is performance expectation. Cronbach Alpha depicts a poor correlation of 0.633 (< 0.6**)** . Thus, PE as stated in the study has a poor correlation.

H2 Effort Expectancy (EF)

User training plays a vital role in training LIS professional in the use next generation ILS. It is revealed in the study that most LIS professionals lack IT and technical expertise. The effort expectancy (EE) is concerned with issues of the system easy to use, complexity and the "degree to which individuals believes that the system helps to improve job performance" (Chao,

2019:4; Momani, 2020:84). EE represents LIS professional in academic libraries is concerned with beliefs regarding easy to use of the next-generation ILS. Breeding (2020) that "the library industry has consistently consolidated over the past two decades with number of vendors narrowing each round of acquisition". It is vital for libraries to identify the type of training to be aimed at equipping core library IT staff and systems librarian with adequate knowledge and skills on the system installation and all functions of the next generation ILS, this will help with in-house training to other staff members in the future. Refresher training should be done on regular basis with staff to ensure that they do not become redundant in using the system and other IT tools. In the case of an open-source software like Folio acquisition, consultation should collaborate with institutional ICT and expert team with an expert knowledge of library ILS installation to prevent where IS projects that remain in the hands of an individual IT staff member. Most studies indicate that EE did not have a positive effect on behavioural intentions (Ayaz & Yanartas, 2020; Aytekin et.a.l, 2022). Cronbach Alpha depicts a poor correlation of 0.633 (< 0.6**)**. Thus, EF as stated in this study has a poor correlation.

H3 Social Influence (SI)

It has been determined that social influence factor has a significant effect on the intension to use in the adoption of next generational ILS, other people in a network could influence users. According to Aytekin *et al*. (2022) and Momani, (2020) the social environmental factors become effective when the use of technology is mandatory and not voluntary, however the variables of gender, age, voluntariness of use and experience may differ on social influence. It been revealed that younger generation adopt easily to new technology than older generation. The LIS professionals who will be using the system should have the knowledge of the system benefits, system evaluation and necessary support provided by top level management to ensure that staff adopt to next generation ILS more. The acceptance of next-generation ILS will be

contributed by the provision of necessary training. Cronbach Alpha correlation indicates there was a positive correlation of 0.888 (0.8 < 0.9) between librarians' factors and use of the next generation ILS in academic libraries in South Africa. Thus, SI as stated in the study have a positive correlation.

H4 Facilitating condition (FC)

Aytekin et al. (2022:80) state that Facilitating condition (FC) is a measure of an individual's level of belief in the existence of a system's technical and organizational infrastructure. FC are identified as direct determinant of usage behaviour. Users can access next generation ILS anywhere on cloud. To function effectively in the digital environment, LIS professionals need to regularly update their ICT skills, according to the literature (Sibiya & Ngulube, 2023). The study corresponds with the conclusion Song, 2020 that cloud computing offers new opportunities to extend partnerships in which dynamically scalable and frequently virtualized resources are provided as a service of the internet.

Cloud computing emerged during the 3rd industrial revolution and most libraries migrated from the traditional ILS to next generated ILS in less than a decade ago. Mfengu (2014) state that next generation ILS cloud-based systems emerged during the Third Industrial Revolution as a "disruptive technology," allowing inexperienced users to do things and disrupting new practices, whereas "sustaining technology" enhances traditional activities. Currently, academic libraries are experiencing the 5th industrial revolution. The beginning of the fifth industrial revolution represents and the end of the fourth, a period which is being observed by academic libraries and higher education institutions in South Africa. This show that academic libraries, being the foundation of research and education, are intensively exploring how emerging technologies, especially AI data analytics, robotics, machine learning, and improved resource discovery systems, could be leveraged (Mosha, 2025; Narendra et al., 2025). The application of AI in library and information science (LSP) systems and next-generation integrated library systems (ILS) enable more detailed collection management, task automation, and enhanced patron access to resources.

The enthusiasm surrounding the implementation of the new AI technology in academic libraries comes with its successes and challenges. Although, both the organisational infrastructure and processes domains, there is no mention of innovative management approach or any elements of model for adopting emerging innovation. Cronbach Alpha correlation indicates there was a positive correlation of 0.888 (0.8 < 0.9) between librarians' factors and use of the next generation ILS in academic libraries in South Africa. Thus, FC as stated in the study has a positive correlation.

H5 Trust Expectancy (TE)

Environmental Conditions is identified as a trust expectancy (TE) which is concerned with data and information security. TE integrate with Gartner hype cycle. User experience can be influenced by the trust in the use of next generation ILS and services by LIS professionals in terms of privacy and information security makes the user experience better and easier adoption of cloud-based next generation ILS. Amini et.al. (2021) stated that trust model based on responsible authorities are being replaced by algorithm trust model to ensure privacy and security of data, source of assets and identity of individual and things that will assist organizations in ensuring that customers, employees, and partners are not exposed to risks and costs of losing their data. Golightly et.al. (2022) further stated that such analysts such as IDC and Gartner reported that as software vendors shift their business models from premise licensed software to public cloud-based offerings, the number of software-as-a-service (SaaS) products will continue to grow. According to the study the highest factor influencing the adoption and maintenance of next-generation ILS is perceived security and reliability, according to research. Cronbach Alpha indicates there was an excellent correlation of 0.936 (< 0.9) between data network security compliance and the use next generation ILS. Thus, TE as stated in the study has an excellent correlation.

H6 Financial Influence (FI)

Financial Influence (FI) is related to next generation ILS costs, as well as service providers fee and cost of security. Libraries are still operation in silos in terms of purchasing systems or software. According to Adamu et.al. (2021), implementing a new system is one of the most significant and costly projects in academic libraries. This integrates Siguenza-Guzman Framework analysis process concerned with the costs and resources of library processes services analysis and assist academic libraries in decision-making of purchasing the next generation ILS (Siguenza-Guzman et al., 2014). Acquiring a new system in academic libraries demands greater collaboration and resource sharing among libraries due to budget cuts in higher education institutions because of the global economic and financial crisis. The findings revealed that there is a need of a development of national consortium for collaboration and sharing at the national development stage in assisting libraries in consortium collaboration of collectively purchasing ILS for cost savings in their library budget. Cronbach Alpha shows that there was a positive correlation of 0.822 (0.8 < 0.9) between technological factors (i.e., system

quality, information quality, and after sale quality) and adoption of next generation ILS. Thus, FI as stated in the study has a positive correlation

6.6. Integration of UTAUT model with other frameworks

The UTAUT, TAM, Gartner Hype and Siguenza-Guzman frameworks were to explore the model, probe and ascertain technological skills, technical skills, and Library 4.0 skills of LIS professionals in South Africa when adopting and maintaining next generation ILS. The researcher concisely divides each UTAUT component, TAM, Gartner Hype and Siguenza-Guzman frameworks, presenting how they link to the adoption and maintenance of next generation integrated ILS by LIS professionals in academic libraries. The extended UTAUT model emanating for the study takes into consideration of theoretical framework of the study (UTAUT), performance expectancy (PE) , effort expectancy (EE), social influence (SI), and facilitation conditions (FC) as key factors for successful adoption and maintenance of the next generation ILS. In addition, the model UTAUT model was integrated with TAM (Technology Acceptance Model) and Gartner Hype Cycle, and Siguenza-Guzman framework to assist with decision making on purchasing next generation ILS. Therefore, two additional factors trust (TE) expectancy and financial influence (FI) were identified as additional factors in the adoption of next generation ILS then integrated with list of grouping factors discussed in (Table 6) in Section 6.?). Figures 6.1, 6.2 and 6.3. show the various components of UTAUT and TAM, and elements of Seguenza Guzman framework.

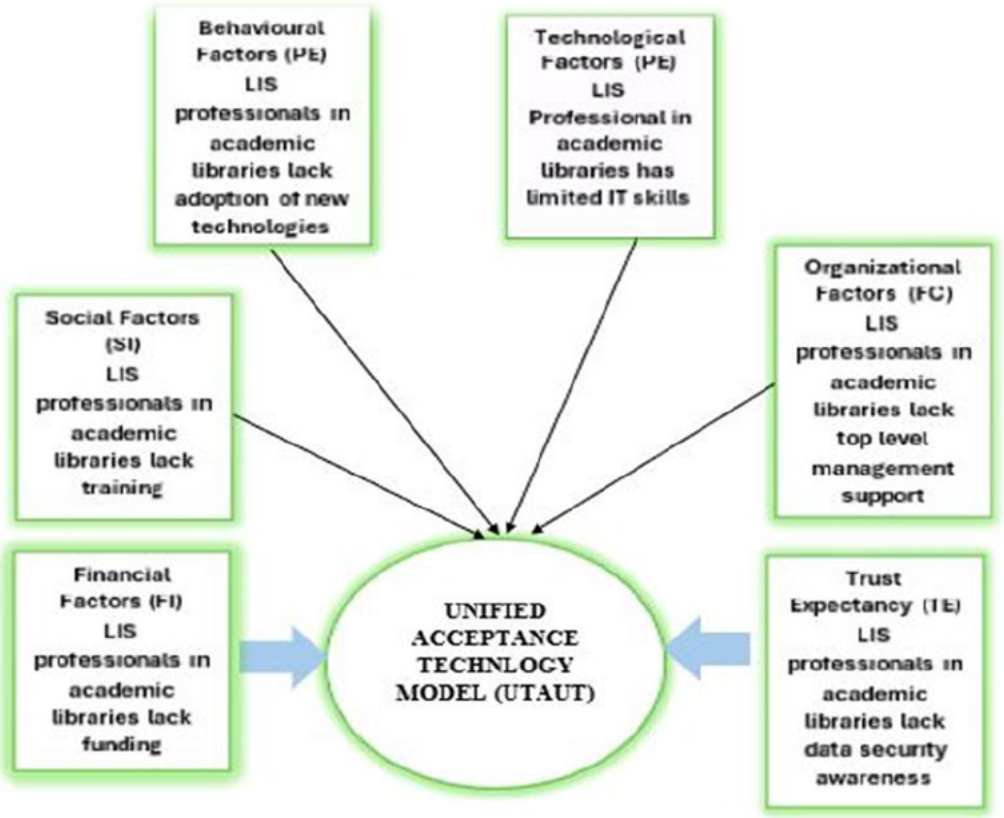

Fig 6-2 UTAUT Model (Adapted from Venkatesh, 2023

Fig 6-3 TAM Model (adapted from Momani, 2020)

Fig – 6-4 Siguenza-Guzman framework (adapted by Siguenza-Guzman et.al., 2014)

Figures 6.1, 6.2 and 6.3 present the theoretical framework used to underpin the study. The questions from the web-based survey and online semi-structured interviews were generated for these frameworks. In the results, components of UTAUT, TAM and elements of Gartner Hype Cycle and Sequenza Guzman feature in the analyzed statistics. Independent variables from the analysis included terms like technological factors, social factors, behavioral factors and organizational factors that are aligned to UTAUT and TAM. Data security, training and budget or financial management became visible in the thematic themes produced from the semi-structured interviews, which are elements of Gartner Hype Cycle and Sequenza Guzman framework**.** The strength of UTAUT, TAM, Gartner Hype Cycle and Sequenza Guzman as selected frameworks for this study came to the forefront when interpretations and discussions were reviewed. In the discussions generic skills, managerial skills, professional skills, technical skills, information technology skills of LIS professionals in academic libraries in South Africa were examined. UTAUT and TAM mapped the path for the researcher to arrive to the conclusions that LIS professionals in academic institutions in South Africa lack information technology (IT) skills in the adoption and maintenance of next generation ILS. Furthermore, Gartner Hype and Sequenza Guzman revealed that LIS professionals in academic libraries in South Africa lack financial skills and data security awareness for the adoption of next generation ILS. Despite the introduction of modern technologies, there is still a problem of underutilized systems among libraries and slow adoption of modern technologies. Thus, the

next section presents the conclusions and implications for revising this gap in the adoption and maintenance of next generation ILS and LIS professionals in South Africa.

6.7 [RQ1, RQ2, RQ3, RQ4] Conclusions to the Study

The previous section summarized the study; the findings of the current study were discussed in the previous section in relation to the theoretical framework that underpinned the study and the literature review. The literature reviewed strengthened an action-oriented approach using pragmatism, resulting in data that was collected, analyzed and interpreted, including discussion in a logical manner. This section draws conclusions from the discussions of the findings.

Firstly, the researcher explored and probe LIS professionals in academic libraries in South Africa related to the maintenance and adoption of the next generation ILS. The theoretical frameworks were selected, literature was reviewed, and the MMR approach in the form of explanatory sequential design used through pragmatism. The explanatory sequential mixed method conveyed an equivalent weighing from both measuring instruments of the study. This projected that the result interpreted from the measuring instruments from varying philosophical stance were proven correct when actioned through pragmatic paradigm of the study.

Moreover, the reliability of the web-based survey had a high reliability closer to the value one established by using Cronbach Alpha Coefficient, whilst the reliability of both instruments was established in the research procedures. The researcher individually analyzed the online semi-structured interview using Microsoft Excel and Otter.ai software. Data was coded using emergent themes and associated codes emanating from the transcriptions. In the next step, empirically analyzed data from the web-based survey and thematic evidence from semi-structured interviews was interpreted. This led to the interpretations being discussed in the finding section discussed the findings section discussed in this chapter. The discussion of the findings included interpretations being discussed in the finding section of this chapter. The discussion included interpretations from the empirically analyzed data, thematic evidence from semi-structured interviews, the literature reviewed and theoretical frameworks. These were all triangulated when findings were discussed in this chapter.

Secondly, one of critical questions in this research aimed to address the competencies of LIS professionals in academic libraries in South Africa when adopting and maintaining next-

generation ILS in a cloud-based environment. From a historic perspective, the literature on several occasions points to LIS professionals lacking in ICT and technical skills. Recently, experts still interrogated the ICT and technical skills of LIS professionals in managing the next generation integrated ILS. Due to peculiar nature of the South African's academic libraries where there is a shortage or lack of expertise and knowledge of library IS (Information Systems) like next generation ILS, IS installation should constitute a compulsory purchasing agreement so that vendors will ensure full implementation of the IS before handing over to the library. This is especially important in the South African Library context since LIS professionals survey on the online web-survey indicated that they lack advanced IT skills or struggle to apply skills and activities after receiving training and workshops offered by their institutions. This situation may negatively affect the intension to adopt the next generation ILS when the institution does not support and train staff in the use of these systems. Therefore, institutions need to have an adequate technical infrastructure by investing in improving their ICT. However, there are studies that contradicts the of positive relationship of FC (Facilitating Conditions) behavioural intension of LIS professionals to function effectively in the digital environment from the UTAUT model. In addition, recent emphasis on enhancing ICT skills across the higher education landscape, it was important for the researcher to re-visit this perception as indicated in the literature. There is no clear consensus regarding ICT's impact on high education environment by LIS professionals in academic libraries both globally and locally. There is uncertainty in how ICTs are being understood, particularly in relation to learning and teaching in South African context. Therefore, the ICT skills of LIS professionals in academic libraries in South Africa were explored through the lens of digital environment.

The researcher determined the literature reviewed LIS professionals in academic libraries fear adoption of new technologies. Additionally, there were limited studies that explored this relation to the adoption of next generation ILS. In terms of LIS professionals in academic libraries in South Africa on the adoption of next generation ILS. This study concludes that there is lack of adoption of next generation ILS. LIS professionals in academic libraries must have knowledge of evaluating systems to determine the need of users as well as their influence on the intention to continue using the system based on TAM and UTAUT models. With regards to the types of next-generation ILS used in academic libraries in South Africa, the research findings revealed that, academic libraries have migrated to the next generation ILS. ALMA (Ex-Libris), Sierra (Innovation), Open Library Foundation's (Folio), SirsiDynix, and World

Share (OCLC) are among the brands used, with Ex-Libris ALMA currently enjoying significant popularity. One library indicated that they have not yet migrated to the new system, however, are in a process evaluating next generation ILS for future migration. LIS professionals believe that if they use the next generation ILS as their library management system, they can be more efficient in performing their task than their previous traditional systems. Technological factors (i.e., system quality, information quality and aftersales quality) are important in system evaluation that needs to be conducted before purchasing or implementing a new system from Siguenza-Guzman framework . Therefore, academic libraries need to stop waiting for modern technologies to seem perfect for certain individuals. It is important to determine the factors affecting the intension to use and adoption of the next generation ILS.

The other issue that needs to be explored is the *traditional compliance* in terms of the adoption of new technologies at higher education institutions across the globe. The LIS profession needs to make a move at higher education institutions to address this issue. In the end, this can only be directed through strategic policies from professional bodies such as LIASA (Librarian Association of South Africa) and CHELSA (Committee of Higher Education Libraries of South Africa). The social influence (SI) from UTAUT model is thought to increase the effective use of the next generation ILS by LIS professionals. This can differ in terms of gender, age, voluntariness of use and experience of LIS professionals . This study reveals that younger generation adopt easily to new technology than older generation. However, this study according contradicts SI's (Social Influences) concepts of positive relationship on behavioural intensions. This is possibly because the current generation using academic libraries are familiar with computers, new innovations, mobile technologies, and video games. Members of this generations have use form of technology at an early stage. Therefore, this generation is born with technology surrounds them, so the need to be influence by their peers disappears. Support from top-level management in the adoption and use of the next generation ILS will allow the system users and managers to adapt and accept the next generation ILS quicker. Therefore, with support received from the top-level management, the process of adaption of the user to the system accelerates. The LIS professionals who will be using or managing the system should have the knowledge of the system benefits, system evaluation and necessary support provided by top level management to ensure that they render effective and effective services to library users.

Next generation integrated ILS are hosted on cloud and therefore most LIS professionals mentioned the risk of data security during the adoption of next generation ILS. During Covid-19 pandemic most libraries were forced to close their libraries to move away from face to face and offer their services virtually. This study reveals that the highest factor influencing the adoption and maintenance of next-generation ILS is perceived security and reliability, according to research. Cronbach Alpha indicates this category of research has an excellent correlation of 0.984 (< 0.9) between data network security compliance and the adoption of next generation ILS. This overlaps with UTAUT and Gartner Hype model in that LIS professionals should be trained and become aware of data security risk pertaining the adoption and maintenance of next generation integrated library ILS. Environmental Conditions in UTAUT model identifies as a trust expectancy (TE) which is concerned with data and information security. LIS professionals need to familiarize themselves with the university's written policies on data protection and security, such as the POPIA (Protection of Personal Information Act), given that data sharing, privacy, and security in universities are crucial due to data security breaches. Furthermore, Gartner Hype Cycle model will assist academic libraries to understand the adoption of emerging technologies and assist technology innovative leaders to understand the opportunities for disruptive technologies particularly those with transformational impact . In addition, lack of provision of facilities and internet access can make users feel that their institutions do not provide necessary skills and support to allow next generation ILS integration in their libraries. LIS professionals may feel insecure about privacy and information security of their systems. They may feel that lack of internet is a challenge for library users accessing library resources. Moreover, library management systems used in libraries does not provide easy access to material via mobile devices accessing library resources available on cloud. Gartner Hype Cycle model can assist libraries in decision making on selecting model to ensure privacy and security of data for the adoption and maintenance of the next ILS in libraries.

Furthermore, it is of critical importance to understand selecting appropriate system and the financial cost of purchasing and evaluating new systems. The Siguenza-Guzman framework and its elements guide the researcher to comprehensive finding and interpretations relating to decision-making process in selecting a purchasing of library management systems. The study reveals that implementing a new system is one of the most significant and costly projects conducted by academic libraries when purchasing a new software or system. These costs

include service provider or vendor's fees which need to be considered by academic libraries when purchasing next generation ILS in their libraries. In most academic libraries globally and locally the final decision in purchasing new software or system in most academic libraries is influence by library directors because of their power in making strategic decisions and budget approvals for all library resources. The findings from both two data sets also revealed that there are two active consortiums that are still in use for collaboration, networking, and sharing best practices in managing ILS in South Africa. The two consortiums are CHELiN, shared by sister universities in the Western Cape, and SEALS, shared by sister universities in the Eastern Cape. The previous consortiums were spread across nine provinces in South Africa such as GAELIC (Gauteng and Environs Library Consortium), FRELICO (Free State Library and Information Consortium), and EsSAL (Eastern Seaboard Association of Libraries), have since been discontinued more than a decade. The findings further revealed that academic libraries in South Africa are still operating in silos and are reliant on their parent institutions for library management systems (LMS) purchases. There is a need of a development of a national consortium in South Africa, this will assist libraries to have more collaboration, share resources and collective purchasing of future library management systems (LMS) for cost savings. Proper planning should be done by academic libraries on IS projects to ensures that there is sufficient budget available towards implementation and development of IS projects. The review of budgets occurs preferably on a regular basis considering local currency to foreign currency rates as IS tools are imported. The next generation ILS should be aligned with the library strategic goals and should fit within the library budget. Ongoing costs such as maintenance, upgrades and system support should also be considered by academic libraries before adopting new systems or software. This, this study concludes that LIS professionals in academic libraries in South Africa lack financial management skills in the adoption and maintenance of next generation ILS.

6.8 [RQ1, RQ2, RQ3, RQ4] Recommendations of the study

Presently, the impact of Industrial Revolution 4.0 and the implementation of ICT connecting diverse resources from various parts of the world to serve library users at anytime and anywhere led to the creation of Library 5.0. Moreover, the advances in ICTs have a philosophical impact on the LIS field. The new roles for library staff pre- and post-Covid-19 have emerged as strong transformative changes in academic libraries. These transformational changes have been

identified as technological advances; library spaces and design; new pedagogies, user behaviour, needs, and expectations. The question that remains is: are LIS professionals reflecting from lessons learned in the adoption of new technologies in the digital environment? In this study, the researcher established LIS professionals in academic libraries in South Africa lacked ICT and technical skills for the digital environment. Literature has constantly challenged LIS professionals and their ICT skills. However, recently the advantage of digital environment has created a convergence between library systems and technology in the form of knowledge of cloud computing needed when adopting and maintaining next generation ILS or Library Services Platforms (LSPs) in the digital environment.

Another important element is the lack of support from institutional ICT infrastructure in the management of library systems. Today's system librarians and other tech-related professionals still carry out the same basic tasks. Traditionally, the role of LIS professionals as system or IT managers has been marginalized in higher education institutions in relation to IT management. Most academic libraries do not have their own bandwidth for managing their own IT departments and rely on institutional IT for infrastructure support. Academic libraries are increasingly using ICT and digital information. Academic libraries in coordination with the institutional ICT should collaborate in budgeting for IS projects and maintenance costs should align with strategic planning. This guarantee that library and institutional projects include the cost of IS services. The provision for future funding, would secure funding for essential IS processes. To avoid project failures caused by purchasing ISs and later abandoning them due to technical difficulties or a lack of support from institutional ICT infrastructure, libraries should make sure they evaluate their systems before purchasing to ensure they perform to their satisfaction.

Training LIS professional in the use and management of next generation ILS is another important factor. To increase the impact of effort expectancy, it has been recommended that more user training should be organized for LIS professional to acquire ICT and technical skills to increase their job performance. The prioritization of training of LIS professionals in the use of IS for a specific library function offering the ability to use the system, is a pre-requisite to the effect of the adoption of the system. Training should be made a core component of a next generation ILS and should include computer use skills and should include the pre-implementation training provided by vendors or developers in charge of the system before and

during the implementation of the next generation ILS. According to the study, the effort expectation factor did not significantly impact the intention to adopt next-generation ILS. A more detailed review of this issue supported by actual evidence could support the determination of causes.

Globally, library collaboration and cooperation are transforming the scholarship landscape as academic libraries fight to stay afloat in the face of rising subscription fees. Most academic libraries in higher education institutions are faced with shrinking budget and ever-increasing user demands, high costs of purchasing library systems, including journal subscriptions and electronic resources. The establishment of a national consortium would scaffold collaboration of libraries in a South African context. This initiative would support the sharing of resources, with resultant costs savings in future purchasing of LMS. Subsequently, members could easily implement the system at a lower cost, with the benefit of guaranteed LMS installation. In terms of this study, the researcher recommends the following to address the adoption and maintenance of next generation integrated ILS in academic libraries in South Africa for the digital environment:

1. The role of library associations such as LIASA is critical to developing library information (IS), digital skills, ICT (Information Communication and Technology) skills, technical, professional and negotiation skills. These LIS associations need to take a leading role in preparing LIS professionals for future IT roles in the tertiary education sector of Suth Africa. The LIS association need to strategize in providing opportunities for LIS professionals developing ICT and technical skills through relationships within associations. These opportunities can be provided through conferences, seminars, webinars, and interest groups at regional and national levels in South Africa.
2. Concurrently, SANLIC and CHELSA and expects from the LIS industry need to start a process of negotiations with stakeholders and policy makers in the higher education sector to advocate the importance of ICT in education to the all-inclusive development of students at South African higher education institutions in South Africa at the first-year experience for all students.

3. Library and Information Science schools in South African higher education institutions must offer a short module covering ICT literacy to prepare graduates for IT roles and developing information systems which will assist users meeting their information needs efficiently. This module should cover aspects such as web design and content management, e-learning, ICT applications, network applications, library management systems, artificial intelligence, software development, database management and design. The framework of such modules within the LIS curriculum in south Africa will develop, prepare, and support LIS professionals in their future IT roles and management of their library systems in academia.Library management and LIS professionals with ICT profile in academic libraries in South Africa must explore short courses related to ICT literacy in the 5IR. These courses are offered by many universities in South Africa and address topics related to Data Communication and Networking skills, sought to empower graduates with networking skills including basic network trouble shooting. Database Concept and Design Modules, incorporate data management system architecture, data security and integrity. Web Development and Content Management, empower students with skills to develop simple and complex website. Library management systems introduce a variety of software such as next-generation ILS e.g. ALMA and library software such as FOLIO for managing routine library operations like circulations, acquisitions, cataloguing and discovery tools. It is also highly recommended that LIS programmes broadly take a proactive holistic approach, and direct interest in artificial intelligence (machine learning or data science) alongside and offering and contribution in information ethics, while closely examining their own ever-evolving local labour practices, policies, and processes.

4. National Consortium to be formed and should consider acquiring a unified next generation ILS. Historically, collaboration and resource sharing played a critical role in academic libraries. In addition, inter library loans services resources sharing amongst academic libraries both national and internationally. Additional platforms of collaboration are cooperative collection development and joint storage of material. Strategic partnerships in collaboration offer opportunities for mechanisms to achieve inclusivity, social justice and the sustaining of relevance and value of the academic libraries. This effectively echoes and uplifts the fundamental library consortium principle of cooperation and sharing on to the national development stage by assisting libraries in consortium collaboration of collectively purchasing ILS systems for cost savings in their library budget. This study conclude that critical mindsets help companies manage disruptive technological innovation.
5. Vendor support library software should collaborate with top-level management of libraries to ensure next generation ILS that will take care of users' needs.
6. Top-level management should prioritize funding to drive next generation ILS adoption and support library automation while university librarians/library directors, ICT and other stake holders should advocate and encouraging skills to attract funds in the library.
7. Training of staff on the use of next generation ILS for specific library functions should be prioritised by libraries as the ability and willingness to use the system is a pre-requisite to the effectiveness of the system.
8. Libraries should test and evaluate the next generation ILS before purchasing the system to avoid IS project failures.

6.9 Contributions of the study

The study developed a model designed to assist LIS professionals regarding best practices and standards in selecting suitable next generation ILS to meet their business requirements as well as impact on their occupational performance. At the same time, it offered the possibility of collaboration, training, resource sharing and collective purchasing of future library management systems (LMS) through a development of a national library consortium in South Africa.

The study suggested a unique chance to assess the Cronbach alpha in South African next generation integrated library (ILS) system adoption and maintenance with existing challenges. These challenges that are not typical to the Western world settings that have been used to assess this model.

This was the first study that explored the adoption model rooted in a diversity of theories such as TAM, UTAUT, Gartner Hype Cycle Siguenza- Guzman framework.

The study was able to fill a gap in the literature in the South African library literature on the extent of the adoption of the next generation ILS and how they are managed and maintained.

6.10 Limitation of the Study

There are four limitations of study. The first limitation was the timeline of surveying and interviewing the participants. This was originally 16 weeks for the quantitative survey and 8 weeks for interviews, as a longer data collection would allow those with limited time to participate. The survey stretched to 5 months for the survey and 3 months for the interviews due to a lack of participation and inclusion of LIS professionals form 17 out 26 public universities in South Africa. There was a lack of participants from LIS directors due to directors attending meetings, conferences, and workshops. Prospective participants indicated that they were newly employed in their current jobs and were not willing to participate.

The second limitation was that participants in the survey may not have been representative of the entire public universities, LIS professionals. Some institutions were resistant, and others did not understand their institutional ethics procedures or the department/s in charge of the external ethics process for researchers and postgraduate students. The time delays involved in obtaining ethical reviews and the competencies of research ethical committees regarding technical and ethical aspects of the study are among the pragmatic objections to the study.

Thirdly, the effort expectation (User training) factor did not significantly affect the intention to adopt next-generation ILS. EE may be a prerequisite for usage; it may not have a significant impact on LIS professionals' decision to adopt the next-generation ILS.

Lastly, the limitation was that of the system vendor's method for identifying problems with the current systems. Although this question was included in the study, there was not enough data,

with participants confusing it as to the question of steps needed for purchasing new software or a system.

6.11 Further Directions

This study examined the impact of next-generation ILS adoption and maintenance on how LIS specialists implement these systems. Future research on how next generation ILS management affects how library users use the system will be helpful given that the adoption of next generation ILS is intended to meet user needs.

Both recent and earlier studies have shown that LIS professionals lack the necessary technical and ICT skills This shortfall has a negative impact on the adoption and maintenance of the next generation ILS. To make recommendations or proposals that are pertinent for the use and adoption of the next generation ILS in the delivery of library services, the researcher recommends a further study that looks specifically into the technical and ICT skills of required LIS professionals in the adoption and maintenance of the next generation ILS.

The researcher suggests an exploration of functionality and usability of a particular next generation ILS to provide an independent view from that of the vendors to guide the LIS professionals in their choice of next generation ILS for library functions. It was found in this study that libraries were using distinct types of next generation ILS or library management system (LMS) and had even switched from one for another in some cases. This observation hints at the potential of additional, in-depth research project work.

REFERENCES

Abdelhakim, S.A. and Badr, R.M. 2021. Adopted research design by tourism and hospitality postgraduates in the light of research onion. *International Journal of Tourism and Hospitality Management*, 4(2): 98-124. Available: https://doi.org/10.21608/ijthm.2021.206774. (Accessed 28 May 2023).

Adamu, I.D., Ibrahim, U. and Gbaje, E.S. 2020. Reasons for integrated library system (ILS) switching in Nigerian university libraries. *Samaru Journal of Information Science*, 20(1): 20-29. Available: https://www.ajol.info/index.php/sjis/article/view/202688. (Accessed 20 April 2023).

Ajibade, P. 2018. Technology Acceptance Model limitations and criticisms: exploring the practical applications and use technology-related studies mixed-methods and qualitative researchers. *Library Philosophy and Practice,* 1941(e-journal): 1-14. Available: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=5294&context=libphilprac. (Accessed 18 December 2022).

Ajuwon, A.J. 2020. Ethical principles and responsible conduct in research. African. Journal of Biomed. Res, Vol. 23 (2): 11-13. Available at: https://www.ajol.info/index.php/ajbr/article/view/202659. (Accessed 17 April 2024).

Al-Ababneh, M.M. 2020. Linking ontology, epistemology, and research methodology. Science and Philosophy, 8(1): 75-91. Available https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3708935. (Accessed 23 March 2024).

Ali, A. 2021. Quantitative data analysis. n.k. Available: http://dx.doi.org/10.13140/RG.2.2.23322.36807 . (Accessed 5 June 2024).

Amini, M., Vakilimofad , H. and Saberi, M.K. 2021. Human factors affecting information security in libraries. *The Bottom Line, 34(1)*: 45-67. Available https://doi.org/10.1108/BL-04-2020-0029 . (Accessed 10 May 2024).

Amirrudin, M., Nasution, K.., and Supahar, S. 2020. Effect of variability on Cronbach Alpha reliability in research Practice. *Jurnal Matematika, Statistika Dan Komputasi*, *17*(2), 223-230. Available: https://www.researchgate.net/publication/348111549_Effect_of_Variability_on_Cronbach_Alpha_Reliability_in_Research_Practice#fullTextFileContent. (Accessed 28 March 2023).

Anderson, J. and Lightfoot, A. 2020. Research methods in language teaching and learning. In: Dikilitas, K. & Reynolds, K.M. ed. Exploratory Research. New Jersey: John Wiley. Available: https://www.researchgate.net/publication/359245813_Exploratory_Survey_Research. (Accessed 11 April 2024).

Andrate', C. 2021. The inconvenient truth about convenience and purposive samples. *Indian Journal of Psychological Medicine,* 42 (1): 86-88. Available: https://journals.sagepub.com/doi/pdf/10.1177/0253717620977000. Accessed 28 March 2023).

Aramide, K.A., Jacob, U.S. and Pillay. J. 2024. Conceptualization and contextualization of mixed-methods research: a review. *Research in Social Science Technology*, 8(4): 15-36. Available: https://www.ressat.org/index.php/ressat/article/view/742/181. (Accessed 29 May 2024).

Arch, X., & Gilman, I. (2017). Innovating for Impact: The Next Evolution of Library Consortia. *Collaborative Librarianship*, *9*(4), 250. Available at: https://digitalcommons.du.edu/cgi/viewcontent.cgi?article=1364&context=collaborativelibrarianship. (Accessed 14 July 2025).

Asenehabi, B.M. 2019. Basic of research design: a guide to selecting an appropriate design. Basics of research design: a guide to selecting an appropriate research design. *International Journal of Contemporary Applied Researchers*, (6)5: 76-89. [Online]. Available: http://ijcar.net/assets/pdf/Vol6-No5-May2019/07.-Basics-of-Research-Design-A-Guide-to-selecting-appropriate-research-design.pdf. (Accessed 7 November 2023).

Ashiq, M. Rehman S.U. and Mujtaba, G. 2020. Future challenges in emerging roles of academic libraries. *Information Development*, 37(1): 158-173. Available: https://journals.sagepub.com/doi/pdf/10.1177/0266666919897410. (Accessed 19 March 2023).

Association of College and Research libraries. 2020. A review of the trends and issues affecting academic libraries in higher education. *Research Planning Review*, 81(6). Available: https://crln.acrl.org/index.php/crlnews/article/view/24478/32315. (Accessed 5 November 2021).

Asubiaro, T.V. and Badmus, O.N. 2020. Collaboration, clusters, scope, interdisciplinarity and subject classification of library and information research from Africa: and analysis of Web of Science publications from 1996-2015. *Journal of Librarianship and Information Science,* 52(4): 1169-1185. Available: https://journals.sagepub.com/doi/epub/10.1177/0961000620907958. (Accessed 23 March 2024).

Ayaz, A. and Yanartaş, M. 2020. An analysis on the unified theory of acceptance and use of technology theory (UTAUT): acceptance of electronic document management system (EDMS). Computers in Human Behavior Reports, 2 (2020) 100032. Available: https://www.sciencedirect.com/science/article/pii/S2451958820300324. (Accessed 22 February 2023).

Aydin, H. 2021. A study of computing adoption in universities as guideline to cloud migration. Sage Open, (2021): 1-14. Available: https://journals.sagepub.com/doi/full/10.1177/21582440211030280. (Accessed 16 May 2024).

Ayoub, A., Amin, S., & Wani, Z. A. (2018). International Coalition of Library Consortia (ICOLC): Exploring the Diversity and Strength of Participating Library Consortia. Library Philosophy and Practice, 1. Available at: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=5485&context=libphilprac. (Accessed 12 July 2025).

Aytekin, A., Özköse, H. and Ayaz, A. 2022. Unified theory of acceptance and use of technology (UTAUT) in mobile learning adoption: systematic literature review and bibliometric analysis. *Journal of Scientometrics and Information Management*, 16(1): 75–116. Available: https://www.tandfonline.com/doi/abs/10.1080/09737766.2021.2007037. (Accessed 22 My 2023).

Badii, C., Bellini, P., Difino, A., Nesi, P. 2020. Smart city platform respecting GDPR privacy and security aspects. *IEEE,* 81(2020): 23602- 23623. Available: https://ieeexplore.ieee.org/abstract/document/8966344. (Accessed 16 May 2024).

Baffour B., King, T. and Valente T. 2013. The modern census: evolution, example and evaluation. *International statistical review*, 81:3:407 – 425. Available: https://www.jstor.org/stable/pdf/43299644.pdf. (Accessed 17 May 2024).

Balaji, P.B., Vinay, M.S., Anitha, K., Khan, M.R., Edwin, E. and Shalani, B.G. 2021. A review of next generated integrated library system and web scale discovery services in India. *Library Hi-tech* News, 7(2021): 14-18. Available: https://www.emerald.com/insight/content/doi/10.1108/LHTN-09-2021-0061/full/pdf?title=a-review-of-integrated-library-systems-and-web-scale-discovery-services-in-india. (Accessed 13 April 2024).

Benedetti, G., Boehme, G., Caswell, T.R., Delinger, K. & Li, Y, McAllister, A. D., Quigley, Brian, D., Soehner, Catherine B., Minglu, W. & Wesolek, A. J. 2020. 2020 Top Trends in Academic Libraries. *Library Faculty Presentations & Publications*, 80, 271-278. Available: https://digitalcommons.unf.edu/cgi/viewcontent.cgi?article=1079&context=library_facpub. (Accessed 20 February 2023).

Bhalla, S., Bahar, N. & Kannapathy, K. 2023. Pre-testing semi-structured interviews using expect review and cognitive interview methods. *International Journal of Business Management,* 7(5): 11-19. Available at: https://www.researchgate.net/profile/Sunil-Bhalla/publication/374921706. (Accessed 14 April 2023).

Breeding, M. 2019. Library system report: cycles of innovations. *American Libraries,* 50(5): 22-35. Available: https://www.jstor.org/stable/26677417. (Accessed 16 May 2023).

Breeding. M. 2020. Library System Report 2020: fresh opportunities amid consolidations. *American Libraries*, 60 (5): 22-25. Chicago: American Libraries. Available: https://www.jstor.org/stable/26993066?casa_token=27Bg5hVDinkAAAAA%3ABYu30EO4evzPYhBbmqQosjGLnO5t58WpMKRU8Q2vM3GaNdbsRydFh_eZ0YbaXKhNTS1c5VerEaSEZKaAFtJD9KIQ--A_NHLB9mQT7XbIgw8RZUjzStg3. (Accessed 9 May 2024).

Boughey & Mckenna. 2021. Understanding higher education: alternatives and perspectives. Cape Town: African Minds.
Available:
https://library.oapen.org/handle/20.500.12657/51123. (Accessed 21 March 2023).

Busher, J.M. 2012. Internet Interviewing. In Gubrium J, Holstein, A and Mavarsti, K. eds. *Handbook of Interview Research*. New York: Sage, 1-31. Available: https://www.researchgate.net/publication/282789901_James_N_Busher_H_2012_Internet_Interviewing_J_Gubrium_J_Holstein_A_Marvasti_K_McKinney_eds_Handbook_of_Interview_Research_2nd_edition_New_York_Sage#fullTextFileContent. (Accessed 29 June 2022).

Cisneros-Corrales, E.D. & Acosta-Lozano, Y.L. 2021. Key factors for the design of integrated library systems in universities. *AtoZ novas práticas em informação e conhecimento*, 10 (2): 49-57. Available:
https://www.researchgate.net/publication/351472600_Key_factors_for_the_design_of_integrated_library_systems_in_universities

Chao, C. 2019. Factors determining the behavioral use of mobile learning: an application and extension to UTAUT Model. In: Vaille, V. (Ed). *Frontiers in Psychology*, 10 (1652):1-13. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6646805/. (Accessed 2 May 2023).

Chege, K.A., & Otieno, O.C. 2020. Research philosophy design and methodologies: a systematic review of research paradigm in information technology. *Global Scientific Journal*, 8(5); 33-38. Available at: https://www.globalscientificjournal.com/researchpaper/Research_Philosophy_Design_and_Methodoogies_A_Systematic_Review_of_Research_Paradigms_in_Information_Technology_.pdf. (Accessed 24 March 2024).

Chisita, C.T. 2021. Proposing a library consortium model for national development in Zimbabwe. *International Journal of Library and Information Services,* 10(2): 1-16. Available: https://www.igi-global.com/gateway/article/full-text-pdf/280356&riu=true. (Assessed 12 February 2023).

Chisita, C.T & Chizoma. 2020. Rethinking academic libraries space amidst of Covid-19 pandemic in South Africa. *Information Discovery and Delivery, 42 (2): 105-113.* Available:

Chiware, E. 2016. Academic libraries and networking in South Africa. *Proceedings of the IATUL conference*. January 2018. Bolzano: Purdue University. Available: https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=2147&context=iatul (Accessed 26 April 2020).

Churchill, G.A. & Iacobucci, D., 2002. *Marketing research: methodological foundation*. 12th ed. Nashville, T.N: Earlie Lite Books.

Committee of Higher Education Libraries in South Africa. 2021. State of South African Library report: embracing new frontiers. [Unpublished report]. Pretoria: CHELSA. [Online]. Available: https://chelsa.ac.za/reading/state-of-south-african-academic-libraries-report/. (Accessed 23 May 2022).

Coetzee, J., Neneh, K., Lamprecht, J., Motsitsi, C. & Sereeco, W. 2021. Research Design. 5th Edition. London: Sage. Available: https://spada.uns.ac.id/pluginfile.php/510378/mod_resource/content/1/creswell.pdf. (Accessed 20 June 2022).

Creswell, J.W. & Creswell, J.D. 2018. Research Design. 5th Edition. London: Sage. Available: https://spada.uns.ac.id/pluginfile.php/510378/mod_resource/content/1/creswell.pdf. (Accessed 20 June 2022).

Creswell, W. 2021. A concise introduction to mixed method research. 2nd edition: London: Sage.

Curaj, C., Georghiou, L. & Harper, L.C. 2015. Merger and alliances in higher education: international practice and emerging opportunities. London: Springer. Available at: https://link.springer.com/book/10.1007/978-3-319-13135-1. (Accessed 21 March 2024).

Dawadi, S., Sherstha, S., Giri, R.A & Ram A. 2021. Mixed-methods research: a discussion on its types, challenges, and criticisms. *Journal of Practical Studies in Education*, 2(2): 25-36. Available: https://files.eric.ed.gov/fulltext/ED611786.pdf. (Accessed 13 November 2022).

Depraetere, J., Vandeviver, C., Keygnaert, I., & Beken, T. V. (2020). The critical interpretive synthesis: an assessment of reporting practices. *International Journal of Social Research Methodology*, *24*(6), 669–689. https://doi.org/10.1080/13645579.2020.1799637. (Accessed 13 July 2025).

De Souza, A. C., Alexandre', N.M.C. 2017. Psychometric properties in instrument evaluation of reliability and validity. Epidemiol. Serv. Saude, Brasília, 26(3): 1-11. Available: https://www.researchgate.net/publication/319070974_Psychometric_properties_in_instruments_evaluation_of_reliability_and_validity. (Accessed 12 May 2024).

Dixon, B. & Eklund, A.N. 2023. Introduction: pragmatism, dewey and design enquiry. *Massachusetts Institute of Technology*, 39(4): 3-8. Available at: https://direct.mit.edu/desi/article/39/4/3/117768/Introduction-Pragmatism-Dewey-and-Design-Inquiry. (Accessed 25 March 2024).

Dongare, M. P. (2022). New trend in ICT and its impact on library services and functions: Regards with IoT. Indian Journal of Library Science and Information Technology, 7(1), 14–17. Available: https://www.ijlsit.org/journal-article-file/16822. (Accessed 16 May 2024).

Drolet, M.J., Rose -Derouin, E., Leblanc, J.C., Ruest, M. & William- Jones. 2022. Ethical issues in researchers, research ethics board members and research ethics experts. *Journal of Academic Experts*, 21 (2023: 269-292. Available at: https://link.springer.com/article/10.1007/s10805-022-09455-3. (Accessed 17 April 2023).

Dzwigol, H. 2022. Comparing idiographic and nomothetic approaches in management science research. Virtual Economics, 5 (4): 27-49. Available at: https://www.researchgate.net/publication/369740214_Comparing_Idiographic_and_Nomothetic_Approaches_in_Management_Sciences_Research. (Accessed 1 April 2024)

Elliot, V. 2018. Thinking about coding process in qualitative data analysis. *The Qualitative Report*, 23(11): 2850-2861. Available: https://nsuworks.nova.edu/cgi/viewcontent.cgi?article=3560&context=tqr. (Accessed 23 April 2023).

Eitekan, I. & Bala, K. 2017. Combination of probability sampling method with non-probability sampling method (sampling versus sampling methods). *Biometrics & Biostatics International Journal*, 5(6):210-213. Available: https://www.researchgate.net/publication/321257510_Combination_of_Probability_Random_Sampling_Method_with_Non_Probability_Random_Sampling_Method_Sampling_Versus_Sampling_Methods. (Accessed 25 April 2021).

Gaikwad, M. N., & Bilawar, P. B. 2023. Transforming Academic Libraries: Exploring Emerging Trends and Technologies. *LIS Links Newsletter*, 9(1), 1-9. Available: http://file.lislinks.com/newsletter/lislinks-newsletter-vol-9-no-1-p-1-9.pdf. (Accessed 16 May 2024).

Gale, N.K., Heath, G., Cameron, E., Rashid, S.& Redwood, S. 2013. Using framework method for the analysis of qualitative data in multi-disciplinary health research, BMC Medical Research Methodology. Available: https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/1471-2288-13-117. (Accessed 3 Sember 2023).

Ganesha, H.R. & Aithal, P.S. 2022. Approaching research in different ways: how to choose an appropriate research approach/reasoning during a PHD progamme in India. *International Journal of Philosophy and Languages,* 1(1): 59-74. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4263413. (Accessed 6 April 2024).

Gartner, H. 2022. Gartner's hype cycle. [online]. Available: https://www.gartner.com/en/research/methodologies/gartner-hype-cycle. (Accessed 29 November 2023).

Grammenis, E. & Mourikis, A. 2020. Migrating from integrated library systems to library services platforms: an exploratory qualitative study for the implications on academic libraries' workflows. *Qualitative and Quantitative Methods in Libraries*, 9: 343–357. [Online]. Available: http://www.diva-portal.org/smash/get/diva2:1234039/FULLTEXT01.pdf. (Accessed: 24 May 2021).

Golightly, L., Chang, V. Qu, Q.N., Gao, X. & Leu, B.S. 2022. Adoption of cloud computing as innovation in the organization. *International Journal of Engineering Business Management*, 14 (2022): 1-17. Available: https://journals.sagepub.com/doi/pdf/10.1177/18479790221093992. (Accessed 10 May 2024).

Gunasekare, T.P. 2015. Mixed Research Method as the Third Research Paradigm: A Literature Review. *International Journal of Science and Research*, 4 (8): 361-36. Available at SSRN: https://ssrn.com/abstract=2735996. (Accessed 20 April 2024).

Hakemi, A. & Masrom, M. 2019. Factors influencing information system adoption: a review of literature. *International Journal of Internet, Broadcasting, and Communication,* 11 (2): 19-26. [Online]. Available: https://koreascience.kr/article/JAKO201916842431892.page. (Accessed 22 August 2022).

Harisanty, D., Shafira, E., & Isbandy, S.H. 2020. Library automation system in library university of Sebelal Malet Indonesia: migration from UNSLA to SLiMS. *Library Philosophy and Practice,* (e-journal) 4376. [Online]. Available: https://digitalcommons.unl.edu/libphilprac/4376/. (Accessed 21 May 2023.)

Hildebrand, D.L. 2023. Philosophical pragmatism and the challenge of information technologies. The Pluralist, 18(1): 1-9. Available at: https://scholarlypublishingcollective.org/uip/pluralist/article/18/1/1/343591/Philosophical-Pragmatism-and-the-Challenges-of. (Accessed: 1 April 2024).

Hong, D.M.& Anh, D.T.N. 2021. Library in the Context of the Industrial Revolution 4.0: trends, opportunities, and challenges. *International Journal of Advance Research and Innovative Ideas in Education*, 7 (3):366-370. Available: http://ijariie.com/AdminUploadPdf/Library_in_the_Context_of_the_Industrial_Revolution_4_0__Trends__Opportunities_and_Challenges_ijariie14197.pdf. (Accessed 15 June 2022).

Hotsonyame, G.N. 2023. Significance of academic libraries in recent times: a review of articles. *Library Philosophy and Practice*, (e-journal): 7736. Available: http.//www.researchgate.net/profile/George-Hotsonyame-2/publication/371487813. (Accessed 9 May 2024).

Hussain, A. 2020. Industrial revolution 4.0: implication to libraries and librarians. *Library Hi Tech News*, 37(1): 1–5. Available: https://www.emerald.com/insight/content/doi/10.1108/LHTN-05-2019-0033/full/html. (Accessed: 13 October 2022).

Idlalama, O.Z. 2020. Perception and attitude of librarians towards cloud computing in the University of Dar es Salaam Library. *Library Philosophy and Practice,* 2(10): 1-15. Available at: https://digitalcommons.unl.edu/libphilprac/4023/.

IFLA. 2015. Libraries and implementation of the UN 2030 Agenda. Available at: https://www.ifla.org/wp-content/uploads/2019/05/assets/hq/topics/libraries-development/documents/libraries-un-2030-agenda-toolkit.pdf. (Accessed 7 July 2025).

Jahnavi, Y. (2021). Consortia, Features, Major Objectives, Models and their Benefits for Libraries in Digital Era. *Journal of Emerging Technologies and Innovative Research*, *8*(2), 1260–1270. Available at: *https://www.jetir.org/view?paper=JETIR2102148*. (Accessed 14 July 2025).

Johnson, J.L., Adkins, D., & Chauvin, S. 2020. Qualitative research in pharmacy education: a review of the quality indicators of rigor in qualitative research. American Journal of Pharmaceutical Education, 84 (1): 138-146. Available at: https://www.sciencedirect.com/science/article/pii/S0002945923016066. (Accessed 9 April 2024).

Joshi, M., Budhani, S. & Tewari, N. 2021. Analytical review of data security in cloud computing. In: *2nd International Conference on Intelligent Engineering and Management.* Amity University, London, 28-30 April 2021. London: IEEE, 362-266. Available: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9445355&casa_token. (Accessed 9 May 2024).

Kaivo-oja, J.R.L. & Lauraeus, I.T. 2018. The VUCA approach as a solution concept to corporate foresight challenges and global technological disruption. *Foresight*, 20(1): 27–49. Available: https://www.emerald.com/insight/content/doi/10.1108/FS-06-2017-0022/full/html. (Accessed 20 August 2022).

Kandel, B. 2020. Qualitative Versus Quantitative research. Marsyangdi Journal, (1): 1-5. Available at: https://link.springer.com/content/pdf/10.1007/s10780-021-09447-z.pdf. Accessed (2 April 20240.

Kashada, K. & Ahtiwsh, E. 2020. The role of Technology Acceptance model (TAM) towards information system success: a meta-analysis. *International Journal of Engineering Science*, 9(1): 30-36. [Online]. Available: https://www.researchgate.net/publication/339080185_The_role_of_technology_acceptance_model_TAM_towards_information_systems_implementation_success_A_Meta-Analysis. (Accessed 10 May 2023).

Katariya, B. 2023. Library database management system: a systematic literature review. International Journal of Humanities Social Science and Management, 3(5): 501-505. Available at: https://ijhssm.org/issue_dcp/Library%20Database%20Management%20System%20A%20Systematic%20Literature%20Review.pdf. (Accessed 8 May 2024).

Khan, A., Ibrahim. M. & Hussain, A. 2021. An exploratory prioritization of factors affecting current state of information security in Parkistani university libraries. *International Journal of Information Management Data Insights*, 1 (2021): 7-8. Available: https://www.sciencedirect.com/science/article/pii/S2667096821000082. (Assessed 18 March 2022).

Khatri, K.K. 2020. Research Paradigm: a philosophy of educational research. International Journal of English Literature and Social Sciences, 5(5): 1435–1440. Available at:https://ijels.com/upload_document/issue_files/15IJELS-109202027-Research.pdf. (Accessed 21 November 2023).

Kiran, N., Aziz, T., Lashari, A.A. 2024. Academic libraries emerging trends in 21st century: a systematic review. *Parkistan Social Science Review*, 8 (1): 270-281, Available: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Academic+libraries+emerging+trends+in+21st+century%3A+a+systematic+review&btnG=. (Accessed 16 May 2024).

Kindy, A. M. Z.A., Shah, I.M. & Jusoh, A. 2016. Consideration and methodological approaches in studying transformational leadership impact on work performance behaviour. *International Journal of Advanced Research,* 4(1):889-907. Available at: https://www.journalijar.com/article/7732/consideration-and-methodological-approaches--in-studying-transformational-leadership-impact--on---work-performance-behaviors/. (Assessed 11 April 2024).

Kivunja, C. & Kuyini, A.B. 2017. 0 Understanding and applying research paradigms in educational context. *International Journal of Higher Education,* 6(5): 26-41. [Online]. Available: https://files.eric.ed.gov/fulltext/EJ1154775.pdf. (Accessed 29 August 2023).

Kouis, D., Kyprianos, K., Efthymiou, F., Koulouris, A. & Karabela, A. 2021. Migrating to a shared Library Management System: evaluation from the perspective of librarians and lessons learned. *Library Management*, 42(6/7): 448–458. [Online]. Available: https://www.emerald.com/insight/content/doi/10.1108/LM-12-2020-0177/full/html. (Accessed 23 April 2023).

Kouis, D. & Agiorgitis. 2022. Library services platforms characteristics and importance of ranking through delphi method application. *International Information & Library Review*, 53(4): 291-305. Available: https://www.tandfonline.com/doi/epdf/10.1080/10572317.2020.1840001?needAccess=true. (Accessed 8 May 2024).

Leedy, P.D. & Ormond, J.A., & Johnson, L.R. 2021. Practical research: Planning and design. 12th ed. Cape Town: Pearsons. Available: https://students.aiu.edu/submissions/profiles/resources/onlineBook/a2g3B6_Practical%20Research_%20Planning%20And%20Design-2020.pdf. (Accessed 21 May 2024). April 2021).

Mfengu, A.Y. 2014. Analysis of the approaches of senior management teams towards the adoption of the next generation library management systems: case study of Cape Library consortiums. MLIS. University of the Western Cape. Available: https://open.uct.ac.za/server/api/core/bitstreams/c8e4963d-1248-46a9-b194-4d2e0f94b386/content. (Accessed 2 July 2021).

Malhotra, G. 2017. Strategies in Research. *International Journal of Advanced Research and development*, 2(5): 172 – 180. Available: https://www.ijarnd.com/manuscripts/v2i5/V2I5-1220.pdf. (Accessed 20 October 2023).

Mallikarjuna, C. 2024. An analysis of integrating artificial intelligence in academic libraries. *Journal of Library & Information Technology,* 44(2): 124-129. Available: DOI : 10.14429/djlit.44.02.18958.

Mendling, J., Berente N., Seidel, S & Grisold, T. 2021 . Pluralism and pragmatism in the information system field: case study of research on business processes and organizational routines. *Database for Advanced Information Systems*, 52(2): 139. Available at: https://dl.acm.org/doi/pdf/10.1145/3462766.3462773?casa_token=IILdR9Wji1AAAAAA:C8P1dZrl493UOfwJ9V6Wf8lpmG6GskNlKSSXcoQFqDB8BmuTow09lSSdwCRkbHDma5KYKnz0NzdsKg. (Accessed 31 March 2024).

Melnikovas, A. 2018. Towards an explicit research methodology: Adapting research onion model for futures studies. *Journal of Futures Studies*, 23(2): 29–44. Available: https://www.researchgate.net/publication/333388233_Towards_an_explicit_research_methodology_Adapting_research_onion_model_for_futures_studies#fullTextFileContent. (Accessed 28 September 2022).

Momani, A.M. 2020. The Unified Theory of Acceptance and Use of Technology: a new approach in technology acceptance. *International Journal of Sociotechnology and Knowledge Development*, 12(3): 79–98. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3630935. (Accessed 14 February 2023).

Monyane, M.C. 2019. Library Automation as a prerequisite for the 21st century library service provision for Lesotho Library Consortiums Libraries. MLIS. University of South Africa. [Online]. Available: https://uir.unisa.ac.za/handle/10500/25754. (Accessed 14 September 2022).

Moruf, H.A., Sani, S. & Abu, Z.I. 2020. Open-source automation software: stirring automated to integrated library system. *Journal of Applied Sciences and Environmental Management*, 24(7): 1273–1278. Available: https://www.researchgate.net/publication/344438404_Emerging_Library_Technology_Trends_in_Academic_Environment_-An_Updated_Review/link/5f7589bda6fdcc00864c40da/download (Accessed 23 November 2021).

Mosha, N. F. (2025). The role of artificial intelligence tools in enhancing accessibility and usability of electronic resources in academic libraries. *Library Management*. Available at: https://doi.org/10.1108/LM-08-2024-0088. (Accessed 15 June 2025).

MS Teams (2022). Available at: https://www.microsoft.com/en-us/microsoft-teams/group-chat-software. (Accessed 12 February 2022).

Muhaise, H., Ijiri A.H., Muwanga-Zake, J.W.F & Kareyo, M. 2020. Research Philosophy Dilemma for Postgraduate Student Researchers. International Journal of Research and Scientific Innovation, 7(4): 201-203. Available at: https://www.researchgate.net/publication/341165417_The_Research_Philosophy_Dilemma_for_Postgraduate_Student_Researchers/link/5eb1dfb8a6fdcc7050ad5685/download?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19. (Accessed 31 March 2024).

Mulisa, F. 2021. When does a researcher choose quantitative, qualitative, and mixed method research approach. Interchange, 53(1): 115-131. Available at: https://link.springer.com/article/10.1007/s10780-021-09447-z. (Assessed 29 March 2024).

Muniraja, A. 2021. Library automation: an introduction. *International Journal of Research in Library Science*, 7(2): 192-198. Available: https://www.researchgate.net/publication/353426551_Library_Automation_-_An_Introduction. (Accessed 21 February 2022).

Mwesi, G.K. 2020. Applications of sampling methods for the research design. *Archives of Business Review,* 8(11): 180-193. Available at: https://www.researchgate.net/publication/346569310_Application_Of_Sampling_Methods_For_The_Research_Design. (Accessed 11 April 2024).

Napitupulu, D. 2017. Analysis of Technology Acceptance Model (TAM) on E-Learning systems. In: Simarmata, D. & Abdillah, L.A, Setiawan, M.I., Ahmar, A.S., Rahim, R., Nurdiyanto, H., Albra, W., Abdullah, D., Erliana, C.I., & Hidayat, R. *Proceedings of the 17th International Conference on Educational and Technology (ICEduTech): Advances in Intelligent Research System,* November 23-24, 2017. Balikpapan, East Kalimantan: Indonesia, 247-251. [Online]. Available: https://www.atlantis-press.com/proceedings/icedutech-17. (Accessed 2 April 2023).

Narendra, A. P., Dewi, C., Gunawan, L. S., & Ardi, A. S. (2025a). Artificial Intelligence Implementation in Library Information Systems: Current Trends and Future Studies. In *Vietnam Journal of Computer Science*. World Scientific. Available at: https://doi.org/10.1142/S2196888824300023 (Accessed 10 June 2025).

Nawi, F.A.M., Tambi, A.M.A, Samat, M.F. & Mustapha, W.S.W. 2020. A review of internal consistency of a scale: the empirical example of the influence of the human capital investment on Malcom Baldridge quality principles in TVET institutions. Asian People Journal, 3(1), 19-29. Available: https://www.researchgate.net/publication/341053464. (Accessed 12 May 2024).

Nayak, J.K. & Singh, P. 2015. Fundamental research Methodology.: problems and concepts. New Delhi: SSDN Publishers. Available: https://www.researchgate.net/profile/Jayanta-Nayak-2/publication/309732183_Fundamentals_of_Research_Methodology_Problems_and_Prospects/links/582056a208aeccc08af641dc/Fundamentals-of-Research-Methodology-Problems-and-Prospects.pdf. (Accessed 30 April 2024).

Ngozi, A.S. 2020. Library Automation in University: a literature review. *Predestinasi 13(2), 115-134*. [Online]. Available at: https://ojs.unm.ac.id/predistinasi/article/view/21934. (Accessed 22 April 2022).

Ngulube, P. 2022. Using simple and complex mixed methods research designs to understand research in Information Science, in Ngulube (ed.) Handbook of research on mixed methods research in information science (pp. 20-44). Hershey, PA: IGI Global.

Ngulube, P. & Mosha, N.F. 2023. Transparency in the use of theoretical frameworks for the advancement of knowledge in core libraries and information science journals: a systematic review. African Journal of Library, Archives and Information Science, 33(2), 129-146. https://dx.doi.org/10.4314/ajlais.v33i2.2.

Ngulube, P. & Okwoma, SC. 2021. Prevalence of methodological transparency in the use of mix method research in library and information science research in South Africa and Nigeria, 2009-2015. Library and Information Science Research, 43(4): 2-8. Available at: https://www.sciencedirect.com/science/article/pii/S0740818821000542. Accessed (23 March 2024).

Nicholson, S. (2004). A conceptual framework for the holistic measurement and cumulative evaluation of library services. *Journal of Documentation,* 60(2), 164–182. Available: https://www.emerald.com/insight/content/doi/10.1108/00220410410522043/full/html. (Accessed 3 October 2022).

Nicholas-Rocca, S. 2019. Information security in libraries: examining the effects of knowledge transfer. Information technology and libraries,38(2): 58-71. Available: https://ital.corejournals.org/index.php/ital/article/view/10973/9495. [Accessed 20 November 2023).

Njoku, L.C. & Ken-Agbiriogu, E. 2021. Awareness and use of cloud computing: its application in selected academic libraries in Imo, State Nigeria. *Journal of Information and Knowledge Management*, 12 (1): 62-78. [Online]. Available: https://www.ajol.info/index.php/iijikm/article/view/213826. (Accessed March 2023).

Nkiko, C. & Okuonghae. 2021. Achieving the 4IR university library in Sub-Saharan Africa: trends and opportunities. *Folia Toruniensia,* 21(2021*)*: 131-137. Available: http://repository.elizadeuniversity.edu.ng:8080/bitstream/20.500.12398/1397/1/Dr.%20Nkiko.pdf. (Accessed 9 May 2024)

Noble, H. & Smith, J. 2015. Issues of validity and reliability in qualitative research. *Evidence-based Nursing*, 18(2): 34-35. Available: https://ebn.bmj.com/content/ebnurs/18/2/34.full.pdf. (Accessed 10 December 2021).

Ocloo, P.E.D., King, L. 2022. Adoption and utilization of next generation integrated library systems in Ghananian academic libraries. *African Journal of Library Archive and Information Science,* 32(1): 1-20. Available at: https://web.p.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=1&sid=64f9e4a3-a7ba-4096-885b-e4cb6024cb1a%40redis. (Accessed 22 March 2024).

Odele, 2020. Rethinking bibliographic utilities for library consortia. Library Hi Tech News, 8(2020): 7-9. Available: https://www.emerald.com/insight/content/doi/10.1108. (Accessed 9 May 2024).

Ogryzek, M. 2023. Sustainable development paradigm. Geomatics and environmental engineering, 17(1): 5-18. Available at: https://www.gaee.agh.edu.pl/gaee/article/view/403. (Accessed 7 April 2024).

Ogwu, C.I., Ekere, J.N. & Ohoh, C. R. 2021. Research paradigm and methodological choices in the research process. Journal of Applied Information Science and Technology, (14)2 (: 116-124. Available at: https://www.jaistonline.org/14vol2/12.pdf. (Accessed 25 March 2024).

Okazaki, S., Eisend, M., Plangger, K., Ruyter, K.D. & Grewal. D. 2020. Understanding strategies' consequences of customer concerns: a meta-analysis review. *Journal of Retailing,* 96(4):458-473. Available: https://www.sciencedirect.com/science/article/pii/S0022435920300361. (Accessed 16 May 2024).

Okesina, M. 2020. A critical review on the relationship between paradigm, methodology, design, and method in research. *Journal of Research and Methods in Education*, 10(3): 57-68. [Online]. Available: https://www.iosrjournals.org/iosr-jrme/papers/Vol-10%20Issue-3/Series-1/K1003015768.pdf. (Accessed 20 March 2023).

O'Leary, D.E. 2008. Gartner hype cycle and information system research issues. *International Journal of Accounting and Information Systems*, 9(2008): 240.252. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1678826. [Accessed 20 February 2021].

Omari, O.A., Khalaf, A., Delaimy, W.A., Qadire, M.A., Khatatbeh, M.M. & Thultheen, I. 2022. Perception of challenges affecting research ethics: committee members at health science colleges in Omani and Jordanian Universities. Journal of Academic ethics, 20 (2002): 227-241. Available: https://www.researchgate.net/publication/350354264_Perceptions_of_Challenges_Affecting_Research_Ethics_Committees'_Members_at_Medical_and_Health_Science_Colleges_in_Omani_and_Jordanian_Universities#fullTextFileContent. (Accessed 3 March 2023).

Otoo, B. K. (2020). Declaring My Ontological and Epistemological Stance: A Reflective Paper. *The Journal of Educational Thought (JET) / Revue de La Pensée Éducative*, *53*(1), 67–88. https://www.jstor.org/stable/27128291

Otike, F. & Barát, Á.H. 2021. Roles and emerging trends of academic libraries in Kenya. *Library Hi Tech News*, 38(7): 19–23. Available: https://www.emerald.com/insight/content/doi/10.1108/LHTN-09-2021-0058/full/htm. (Accessed 20 March 2023).

Otterai (2022). Available at: https://otter.ai/. (Accessed 1 January 2022).

Oyakele, J.O. 2018. An integration of integrated library systems (ILS) in university libraries in Osun, State, Nigeria. *Open Access Library Journal,* 5, e4915: 1-12. [Online]. Available: https://www.scirp.org/journal/paperinformation.aspx?paperid=88587. (Accessed: 22 October 202).

Parnis, J. 2018. Implementation of a next generation management library system at the University of Malta. Diploma in Library and Information Studies. University of Malta. Available: https://www.um.edu.mt/library/oar//handle/123456789/39540. Accessed (13 March 2022).

Patel, M. & Patel, N. 2019. Exploring research methodology: a review article. International Journal of Research and Review, 6(3): 48-55. Available at: https://www.ijrrjournal.com/IJRR_Vol.6_Issue.3_March2019/IJRR0011.pdf. (Accessed 6 April 2024).

Pervin, N. & Mokhtar. 2022. The interpretivists research paradigm: subjective notation of a social context. *International Journal of Academic Research in Progressive Education and Development*, 11(2):419-428. Available: https://hrmars.com/papers_submitted/12938/the-interpretivist-research-paradigm-a-subjective-notion-of-a-social-context.pdf. (Accessed 29 November 2022).

Ponto. J .2015. Understanding and evaluating survey research. *Journal of the Advanced Practitioner in Oncology*, 6(21): 161-178. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4601897/pdf/jadp-06-168.pdf. (Accessed 20 August 2022).

Pradhan, P. 2019. Library Services Platform: an overview. Iflibnet, 25(1): 12-22. Available: https://www.researchgate.net/publication/333816851_Library_Services_Platform_LSP_An_Overview. (Accessed 15 May 2024).

QuestionPro Survey Software (2022). Available: https://www.questionpro.com/survey-templates/.

Raju, J. 2020. Future of LIS education and evolving global competency for the digital information environment: an epistemological view. Journal of Education for Library and Information Science, 61 (3): 343-356. Available: https://files.eric.ed.gov/fulltext/EJ1267822.pdf. (Accessed 22 March 2024).

Ravitch, S. M., & Riggan, M. (2017). Reason and rigor: how conceptual frameworks guide research. (2nd ed). London: Sage.

Reaves, J. 2019. 21st Century skills and the Fourth Industrial Revolution: a critical future role for online education. *International Journal of Innovation in Online Education*, 3(1):1-21. Available: https://onlineinnovationsjournal.com/download/4f6fa2666b8cd098.pdf. (Accessed 25 April 2021).

Regmi, P.R., Waithaka. E., Paudyal, A., Simkhada, P., & Van Teijilingen, E. 2016. Guide to design and application of online questionnaires survey. *Nepal Journal of Epidemiol*, 6(4): 640-644. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5506389/. (Accessed 2 August 2022).

Şahin, M.D., & Öztürk, G. 2019. Mixed method: theoretical foundations designs and its use in educational research. International Journal of Contemporary Education, 6(2): 301-310. Available: at: https://www.efaidnbmnnnibpcajpcglclefindmkaj/https://files.eric.ed.gov/fulltext/EJ1239419.pdf. (Accessed 27 April 2024).

Salih, M.H. 2020. The impact of cloud computing and its applications on libraries and information centers. *Journal of Educational and Social Research*, 10(6): 237–252. Available: https://www.richtmann.org/journal/index.php/jesr/article/view/12270/11866. (Accessed 2 February 2022).

Samea, L. 2015. Academic library consortia in Arab countries: an investigating study of origins, development, and services. International Journal of Library and Information Science, 7(7): 130–147. Available: https://www.researchgate.net/publication/292946825_Academic_library_consortia_in_Arab_countries_An_investigating_study_of_origins_development_and_services. (Accessed 3 June 2022).

Salmons, J. 2010. *Online interviews in real time*. London: Sage. Available: https://psycnet.apa.org/record/2010-16448-000. (Accessed 20 June 2022).

Sammut, R., Griscti, O., Norman, I.J. 2021. Strategies to improve response rate on web surveys: a literature review. International Journal of Nursing Studies, 123 (2021): 1-26. Available at: https://www.sciencedirect.com/science/article/pii/S0020748921002054. (Accessed 11 April 2024).

Sanaullah, M. & Uddin, M.M. 2020. Integrated library management system: an evaluation by a holistic survey in Bangladesh. *The Eastern Librarian,* 25(2): 25-46. Available: https://lab.org.bd/wp-content/uploads/2020/12/V25_N2_03_Sanaullah.pdf. (Accessed 12 December 2021).

Saunders, M.N.K., Lewis, P. & Thornhill, A. 2019. *Research methods for business students*. 8th ed. Available: https://www.researchgate.net/publication/330760964_Research_Methods_for_Business_Students_Chapter_4_Understanding_research_philosophy_and_approaches_to_theory_development. (Accessed 13 March 2022).

Sawant, S. & Yadav, S. 2020. Knowledge, proficiency and expertise required by smart librarians in the digital era. Journal of Indian Library Association, 56(4): 1-15. Available: https://www.researchgate.net/publication/376933337_Digital_Knowledge_Skills_and_Application_among_Librarians_and_Library_Staff_of_MUNPARLAS_Library_Association_Incorporated. (Accessed 5 June 2024).

Shan, Y. 2021. Philosophical foundations of mixed methods research. *Philosophy Campus* 17(1): 1-12. [Online]. Available: https://compass.onlinelibrary.wiley.com/doi/epdf/10.1111/phc3.12804. (Accessed 12 February 2023).

Sharma, A. 2023. General Data Protection Regulation, 2018. *Indian Journal of Law and Legal Research,* (5) 2: 1). Available: https://heinonline.org/HOL/LandingPage?handle=hein.journals/injlolw11&div=322&id=&page=. (Accessed 20 February 2023.

Shastri, D.K. & Chudasma, P. 2022. The perception of ICT skills and challenges of usage of technologies among the library professionals of the Gujarat State during the COVID 19: a comprehensive study. *Quality and Quantity*, (2022) 56:1093-1120. Available: https://link.springer.com/content/pdf/10.1007/s11135-021-01167-x.pdf. (Accessed 23 April 2023).

Shaw, F.N. & De Sarkar. 2020. Cloud-based approach to library management solutions for college libraries. *Information Discovery and Delivery*, 49(4): 308-318. Available: https://www.emerald.com/insight/content/doi/10.1108/IDD-10-2019-0076/full/html. (Accessed: 13 August 2022).

Sibiya, P.T. & Ngulube, P. 2023. Perception of employers in South Africa on library and information science graduates' skills, knowledge and competencies on digital scholarship. *Heliyon,* 9(2): 1-10. Available: https://www.sciencedirect.com/science/article/pii/S2405844023007387. (Accessed 19 April 2023).

Siguenza-Guzman, L., Saquicela, V., & Cattrryse, V. 2014. Design of and integrated decision support system for library holistic evaluation. Proceedings of IATUL Conference. Perdue, USA, 2-5 June 2014. Perdue, University of Perdue. [Online]. Available: https://www.researchgate.net/publication/262877705_Design_of_an_integrated_Decision_Support_System_for_library_holistic_evaluation#fullTextFileContent. (Accessed 23 October 2022).

Sikhosana, R.B, Rajkoomar, M. & Sentoo, R.N. 2022. Adoption and maintenance of the next-generation integrated library systems (ILS) in academic libraries. In: T.M. Masenya (Ed.), *Innovative Technologies for enhancing knowledge access in academic libraries*. IGI Global. [Online]. Available: https://www.igi-global.com/chapter/adoption-and-maintenance-of-the-next-generation-integrated-library-systems-ils-in-academic-libraries/306438. (Accessed 22 August 2022).

Singh, W. 2019. Understanding philosophical underpinning of research with respect to various paradigms: perspective of a research scholar. In: *Proceedings of Doctoral research conference in management*, April 5-6, 2019. Ahmedabad, Gujarat: India. Available: https://www.academia.edu/40390070/Understanding_philosophical_underpinnings_of_research_with_respect_to_various_paradigms_Perspective_of_a_research_scholar. (Accessed 20 June 2022).

Sivankalai, S. 2021. The impact of cloud computing on academic libraries. *Library Philosophy and Practice*, (e-journal) 6207. Available: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=11754&context=libphilprac. (Accessed 2 February 2023).

Song. H.H. 2020. Testing and evaluation of system for cloud computing information security products. *Procedia Computer Science,* 166 (2020): 84-87. Available at: https://www.sciencedirect.com/science/article/pii/S1877050920301459. (Accessed 10 May 2024.

South Africa, Council of Higher Education. 2014. National Qualification Act 67 0f 2008. Higher Education Qualifications Sub-Framework (HEQSF). Accessed: https://www.gov.za/documents/national-qualifications-framework-act. (Accessed 3 March 2023).

South Africa, National Science and Technology. 2023. *National Development Plan*. Pretoria: National Science and Technology Forum. Available: https://nstf.org.za/wp-content/uploads/2021/08/Ch-15-All-The-NDP.pdf. (Accessed 10 April 2023).

South Africa, Office of The Presidency. 1997. *Higher Education Act of 1997*. Office of The Presidency. Available: https://www.gov.za/sites/default/files/gcis_document/201409/a101-97.pdf. (Accessed 28 September 2023).

South Africa, Office of The Presidency. 2013. Protection of Information Act of 2013. Office of The Presidency. Available: https://www.gov.za/sites/default/files/gcis_document/201409/3706726-11act4of2013protectionofpersonalinforcorrect.pdf. (Accessed 20 May 2022).

South Africa, Office of The Presidency. 2012 . National Development Plan 2030. Available at: https://www.gov.za/sites/default/files/gcis_document/201409/ndp-2030-our-future-make-it-workr.pdf. (Accessed 8 July 2025).

South Africa, 2021. State of South African Library Report 2021: embracing new frontiers. Available: https://chelsa.ac.za/wp-content/uploads/2021/11/StateOfSouthAfricanLibrariesReport.pdf. (Accessed 10 March 2023).

South Africa, Voluntary National Review, 2024. 2024 Voluntary National Review. Office of The Presidency. Available at: https://globalcompactsa.org.za/wp-content/uploads/2024/07/Private-Sector-VNR-Report-2024-–-Final.pdf. (Accessed 17 July 2025).

Staller, 2021. Big enough: sampling in qualitative enquiry. Qualitative Social Work, 20(4): 897-104. Available at: https://journals.sagepub.com/doi/10.1177/14733250211024516. (Accessed 29 March 2023.

Stoecker, R. & Avila, E. 2021. From mixed methods to strategic research design. *International Journal of Social Research Methodology*, 24(6):627-640. Available at: https://www.tandfonline.com/doi/abs/10.1080/13645579.2020.1799639. (Accessed 10 April 2024).

Stratton, S.J. 2021. Population research: convenience sampling. *Journal of Prehospital and Disaster Management*, 36(4): . Available: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/B0D519269C76DB5BFFBFB84ED7031267/S1049023X21000649a.pdf/div-class-title-population-research-convenience-sampling-strategies-div.pdf. (Accessed 23 May 2024).

Surucu, L. & Maslakci, A. 2020. Validity and reliability in quantitative research. *Business and Management Studies: An International Journal*, 8(3): 2694-2726. [Online]. Available: https://www.bmij.org/index.php/1/article/view/1540/1365. (Accessed 20 December 2022).

Taber, K.S. 2017. The use of Cronbach's Alpha when developing reporting research instruments in science and technology. *Rec Sci Educ*, 48 (2017): 1273-1296. [Online]. Available: https://link.springer.com/article/10.1007/s11165-016-9602-2. (Accessed 20 July 2022).

Tabri, N., Wood, R.T.A., Philander K., & Wohl, M.J.A. 2020. An examination of od the reliability and validity of the positive play scale: findings from a Canadian national study. International Gambling Studies, 20(2):280-295. Available at: https://www.tandfonline.com/doi/full/10.1080/14459795.2020.1732442. (Accessed 15 April 2022).

Taherdoost, H. 2016. Sampling in research methodology: how to choose a sampling technique for research. International Journal of Academic in Research Management, 5(2):18-27. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3205035. (Accessed 10 April 2024).

Taherdoost, H. 2022. What are different research approaches: comprehensive review of qualitative, quantitative and mixed method researches their applications, types and limitations. *Journal of Management Science & Engineering Research,* 5 (1): 53-62. Available at; https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4178694. (Accessed 3 April 2023).

Tella, A., Akwoma, S.C & Kayode, A.I. 2020. A two models' modification for determining cloud computing adoption for web-based services in academic libraries in Nigeria. *Journal of Academic Librarianship,* 46 (2020): 1-15. Available at: https://www.sciencedirect.com/science/article/pii/S0099133320301464. (Accessed 22 March 2024).

Thacker. 2019. What is the big deal about populations in research. *Progress in Transplantation*, 30(1):3. Available at: https://journals.sagepub.com/doi/10.1177/1526924819893795. (Accessed 11 April 2022).

Thomas, G. & Fourie. 2006. Academic Library Consortia in South Africa: Where We Come from and Where We are Heading. *Journal of Academic Librarianship*, 32(4): 432-438. Available: https://www.academia.edu/28519325/Academic_Library_Consortia_in_South_Africa_Where_We_Come_From_and_Where_We_are_Heading. (Accessed 20 June 2022).

Thomas, L., Gondal, I., Osenu, T., & Firmin, S.S. 2022. A framework of data privacy and security accountability in data breach communication. Computers & Security, 16(2022): 1-15. Available: https://www.sciencedirect.com/science/article/pii/S0167404822000566?casa_token=ez88Jh8Q92EAAAAA:_FI2ARsW_f3XCromkMY0urH4J1N0sJFxqDRRPQCxWZ2IBuNxmZKcRWvGUD38FoKxJQsucEYSlaU. (Accessed 16 May 2024).

Universities South Africa. 2020. *Strategic framework for Universities South Africa 2020- 2026*. South Africa: Pretoria. Available: https://www.usaf.ac.za/wp-content/uploads/2022/05/Universities-South-Africa-Stratigic-Framework.pdf. (Assessed 3 May 2022).

Van der Waldt, G. (2020). Constructing conceptual frameworks in social science research. *The Journal for Transdisciplinary Research in Southern Africa,* 16(1), a758.https://doi.org/10.4102/td.v16i1.758

Vasileiou, K., Barnett, J., Thorpe, S. & Young, T. 2018. Characterizing and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. *BMC Medica Research Methodology*, 18(148): 1-18. [Online]. Available: https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/s12874-018-0594-7. (Accessed 12 December. 2022).

Vaughn, L.M., & Jacquez, F. 2020. Participatory Research Methods: choice in the research process. *Journal of Participatory Research*, 1(1): 1-13. Available at: https://jprm.scholasticahq.com/article/13244-participatory-research-methods-choice-points-in-the-research-process. Accessed (4 April 2024).

Venkatesh, V., Morris, M.G., Davis B.G. & Davis, F.D. 2013. User Acceptance of Information Technology: MIS Quarterly, 7(3): 435-488. Available: https://www.jstor.org/stable/30036540?typeAccessWorkflow=login. (Accessed 1 December 2022.

Venkatesh, V., Thong, J.Y.L. & Xu, X. 2016. Unified theory of acceptance and use of technology: a synthesis and the road ahead. *Journal of the Association for Information Systems*, 17(5): 328–376. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2800121. (Accessed 12 May 2022).

Vialle, W., Akbar, M., Su, C.Y., Lan, C.C. & Chao, C.M. 2019. Factors Determining the Behavioral Intention to Use Mobile Learning: an application and extension of the UTAUT Model. *Frontiers in Psychology*, 10 (1652): 1-14. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6646805/pdf/fpsyg-10-01652.pdf. (Accessed 21 March 2023).

Wadood, F., Akbar, F. & Ullah, I. 2021. The importance and essential steps of pilot testing in management studies: a quantitative survey result. *Journal of Contemporary Issues in Business Government*, 27(5); 2419-2431. Available at: https://d1wqtxts1xzle7.cloudfront.net/102608503/article_16160_6baf28fff8efa53e531bbad85d0f87bf-libre.pdf?1684956943=&response-content-. (Accessed 14 April 2023).

Wibowo, M.P. 2019. Technology acceptance models and theories in library and information science. *Library Philosophy and Practice*. 3674 (e-journal): 1-14. Available: https://www.researchgate.net/publication/338965449_Technology_Acceptance_Models_and_Theories_in_Library_and_Information_Science_Research. (Accessed 4 June 2023).

Yong, W.K., Husin M.M., & Kamarudin, S. Understanding research paradigm: a scientific guide. Journal of Contemporary Issues in Government, 27(2): 5857-5865. Available: https://www.researchgate.net/publication/369670077_Understanding_Research_Paradigms_A_Scientific_Guide/link/64272079a1b72772e43ef206/download. Accessed (5 June 2024).

Zaid, Z., & Larsen D. 2018. Commentary: paradigm, axiology, and praxeology in Medical Education Research. *Association of American Medical Colleges*, 93(1): 51-57. Available: https://www.researchgate.net/publication/328671992_Commentary_Paradigms_Axiology_and_Praxeology_in_Medical_Education_Research. (Accessed 5 June 2024).

Zefeiti, S.M.B.A & Mohamed. 2015. Methodological considerations in studying transformational leadership and its outcomes. *International Journal of Engineering Business Management*, 7(1): 1-11. Available: https://www.researchgate.net/publication/275251741_Methodological_Considerations_in_Studying_Transformational_Leadership_and_its_Outcomes. (Accessed 1 April 2024).

ANNEXURE A: SURVEY QUESTIONNARES TO LIBBRARY AND INFORMATION PROFESSIONALS

SURVEY QUESTIONNARES TO LIBRARY AND INFORMATION PROFFESSIONALS

The development of a model for decision-making for adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa

My name is Regina Balengane Sikhosana, a PhD Library and Information Science student at the Durban University of Technology. The research I wish to conduct for my Doctoral thesis involves the following topic below:

"**The development of a model for decision-making for adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa**".

The definition of successful functioning of systems librarians, technical services staff, front line staff and IT professional roles contributes to determining the gap between the literature and LIS industry expectation. This questionnaire provides information that will assist in several ways **1)** level of adoption of the next generation ILS in academic libraries in South Africa **2)** it will provide us with enough information about staff training and skills development programmes that can be compared to other academic libraries in your field in different universities and **3)** current professional status in the LIS industry and lastly **4)** the role that the consortia in your organization in library automation

I am hereby seeking your consent to undertake this survey as part of this research as willing participants. All participation is on a voluntary basis with all responses being kept confidential and your identities anonymous. It will take approximately [45] minutes to complete the questionnaire There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. We need to learn your opinions. Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the survey or the procedures, you may contact [**Regina Balengane Sikhosana**] at this phone number [**076 979 7378**] or by email [22175407@dut4life.ac.za]. I am also attaching the written consent letter for participants who are willing to complete the survey.

Section A: Demographic information

1. **Gender**

Male ☐ Female ☐ Other ☐

2. **Age**

☐ ≤ 30 ☐ 31–40 ☐ 41 – 50 ☐ 51 – 60 > 65 ☐ Prefer not to answer

3. **Education**

☐ Matric ☐ Diploma ☐ Degree ☐ Master ☐ PhD

☐ Other……

Section B: Organisational affiliation

1. **Institutional Name:** CPUT ☐ DUT ☐ UWC ☐ UCT ☐ WITS ☐ UNISA ☐

UJ ☐ UP ☐ NW ☐ TUT ☐ VUT ☐ MUT ☐ UKZN ☐ SU ☐

UFS ☐ NMU ☐ WSU ☐ UMP ☐ SPU ☐ UNIVEN ☐ SMU ☐

UFH ☐ UNIZULU ☐ CUT ☐ UL ☐ RU ☐

1.2. **Department:** ☐ Technical Services ☐ ICT/IT

☐ User/Client Services ☐ Other (Specify)……

1.3. **Role** ☐ Senior manager ☐ Middle management ☐ Other (Specify)

Other (option)……

1.4. **Number of years you have worked in institution?**

☐ Less than a year ☐ 1-3 years ☐ 4 -6 years ☐ 7-10 years ☐ above 10 years

SECTION C: TECHNOLOGICAL IMPACT OF THE NEXT GENERATION ILS IN LIBRARIES

1. What type of next generation/cloud-based systems or software Integrated Library System(s) (ILS's) are you currently using in your library?

☐ ALMA (Ex-Libris) ☐ Folio (Open Library Foundation)

☐ Sierra (Innovation) ☐ Other (Specify)……

2. Which system(s) (traditional ILS) were in place prior to the current system(s)?

☐ Millenium (Innovative) ☐ Polaris (Innovative)

☐ ALEPH (Ex-Libris) ☐ Other (Specify).....

3. Which factors were considered by your library before adopting the next generation ILS/cloud-based system in your library? Mark all that applies.

☐ Technological Factors i.e., System Quality, Information quality, and After Sale Q[illegible]y

☐ Organizational Factors i.e., Top Level Management Support and User Training

☐ Librarians Factors i.e., Computer Self Efficiency and Librarians Experience

4. What user training qualities were taken into account when considering user-training as factor for the adoption of ILMS?

☐ Training Curriculum ☐ User Commitment

☐ Trainers' Personnel Skills and Competence ☐ Other (Specify)

5. What is your system vendor's method for identifying problems with your current system?

_____

_____

_____

6. Have you ever noticed a significant problem in the adoption of next-generation/cloud-based ILS in your library?

☐ YES

☐ NO

If you indicated NO, please justify your answer

_____

_____

_____

7. How can we reduce failures in the implementation of next-generation/cloud-based ILS in your library?

☐ Top Level Management Involvement ☐ Vendor Support

☐ Staff User Involvement ☐ Interdepartmental Communication

☐ ☐

Data Analysis and conversation Other (Specify)_____

8. Please comment freely on your opinions on how to improve the adoption of next-generation/cloud-based ILS in your library.

_____
_____
_____

SECTION D: LIBRARY PROFFESSIONAL ADOPTION IN THE NEXT GENERATION ILS (Integrated Library System)

a) Which of the following skills and knowledge training are required for library staff to effectively and efficiently manage the adoption and maintenance of next generation ILS in academic libraries? Required = R, Not Required NR

S/N	Generic Skills	R	NR
1	Communication skill		
2	Adaptability		
3	Assertiveness		
4	Innovation		
5	Creativity		
6	Analytical skills		
7	Problem solving		
8	Presentation skills		
9	Time management		
10	Decision making		
11	Customer relationship		
12	Flexibility		
13	Assertiveness		
14	Stress management		
15	Interpersonal skills		

Other (Specify) _____

S/N	Managerial Skills	R	NR
1	Planning and organizational skills		
2	Finance management skills		
3	Local and global thinking		
4	Managing change		
5	Team building		
6	Leadership		
7	Project management		
8	Consumer management skills (User need analysis, Information seeking, behaviour analysis)		
9	Resources management		
10	Negotiation skills		

Other (Specify) _____

S/N	Proffessionals Skills	R	NR
1	**Information Technology Skills**		
1.1	Hardware/ software and networking Skills		
1.2	Library automation		
1.3	Internet e.g., E- Mail management, Intricacies of internet search tools		
1.4	Intranet skill		
1.5	Networking skills (content development, digitization, web-based services, on-line database searching etc.)		
1.6	MS-suite		
1.7	Presentation software e.g., PowerPoint		

Other (Specify) _____

S/N	Technical Skills	R	NR
1	Information resource management		
2	E- serial management		
3	Metadata1 standards e.g. Dublin core, MARC, TEI2 , XML3 etc.		
4	Standards e.g., Z39.50		
5	System development		

S/N	4th Industrial Revolution/Library 4.0 Skills:	R	NR
1	Information curation		
2	digital scanning, preservation;		
3	Cloud data expansion;		
4	in-depth research skills		
6	technology design and programming;		
7	critical thinking and analysis		
8	emotional intelligence;		
10	emotional intelligence;		

Other (Specify) _____

SECTION E: RESOURCE SHARING AND ROLE OF LIBRARY CONSORTIA IN SOUTH AFRICA

1. Which consortiums does your library belong to?

☐ CALICO (Cape Library Consortium)

☐ GAELIC (Gauteng Academic Library Consort

☐ SEALS (South East Academic Library System

☐ Other (Specify).....

2. Are the consortia efforts delivering value to you?

☐ YES

☐ NO

If you indicated NO, please justify your answer

_____

_____

_____

3. How does the support or information you receive from your consortia enhance your library automation status?

_____

_____

_____

SECTION F: DATA PRIVACY AND SECURITY

General Data Protection Regulations (GDPR) adopted by European union in May 2018 became a business requirement and as a collaborative partnership to ensure that adequate measures are in place to protect the management and transfer of personal information in organizations. For accessibility, having a centralised site for data storage management is essential. Structured processes and systems that enable version control and solid security protocols are required for managing, auditing, and protecting data, allowing businesses to gather and manage access to many records and documents. Library privacy practice in response to the challenges of network environment is one of the key roles of ICT and library IT department. This questionnaire is intended to research how organisations such as yours are overcoming the challenge of ongoing data protection compliance.

1. In your organization, who is in charge of data protection?

☐ Data Protection Officer

☐ Compliance and Risk Officer

☐ IT Manager

☐ CTS (Computer and Telecommunication Service Director)

☐ Other (Please specify) _____

2. Who does the person responsible for data protection report to in your organization?

_____

3. What do you think is the general level of data protection awareness is in your organization to provide staff with the knowledge they need to protect your organization's data while

performing their duties in accordance with applicable standards, laws, and cyber security best practices?

E-mail misuse staff awareness

☐ Information Security and Cybersecurity staff awareness

☐ Social media staff awareness

☐ Other (Specify)

4. Does your university have written policies covering or relating to any of the following?

☐ Privacy policy ☐ Data protection policy ☐ E-mail

☐ Internet use policy ☐ Intellectual Property policy ☐ Other (Specify)

5. Which systems/steps to Data and Network Security do you employ to assist you in maintaining data security compliance?

☐ Do not install unapproved software

☐ Think before opening e-mail attachments

☐ Use strong unique password, and never share it

☐ Lock down your computer when away from the desk during the day

☐ Shutdown your computer when you leave for the day

☐ Schedule an antivirus scan for your computer with CTS/IT department

THANK YOU FOR YOUR PARTICIPATION AND TIME.

ANNEXURE B: INTERVIEWS FOR LIBRARY DIRECTORS

INTERVIEW SCHEDULE FOR THE LIBRARY DIRECTORS

The development of a model for decision-making for adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa

Preamble

The definition of successful functioning of systems librarians, technical services staff, front line staff and IT professional roles contributes to determining the gap between the literature and LIS industry expectation. This questionnaire provides information that will assist in several ways 1) level of adoption of the next generation ILS in academic libraries in South Africa 2) it will provide us with enough information about staff training and skills development programmes that can be compared to other academic libraries in your field in different public universities and 3) current professional status in the LIS industry and lastly 4) the role that the consortia play in your organization in library automation

You have been selected to participate to this interview because your library form part of a consortium in academic libraries at 26 Public Universities in South Africa. The interview schedule is designed for you as the Library Director/University Librarian and it is aimed to solicit your views about the development of a model for decision-making for adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa. The interview will take approximately [45] minute of your time.

Interview Questionnaires

Section A: Demographic information

Gender

Male [ ] Female [X] Other [ ]

Age (optional)

[ ] ≤ 30 [ ] 31–40 [ ] 41 – 50 [ ] 51 – 60 > 65 [X] Prefer not to answer

Education

[ ] Matric [ ] Diploma [ ] Degree [X] Master [ ] PhD

[ ] Other.....

Section B: Organisational function:

Institutional Name: CPUT [ ] DUT [ ] UWC [ ] UCT [X] WIT [ ] UNISA [ ]

UJ [ ] UP [ ] NW [ ] TUT [ ] VUT [ ] MUT [ ] UKZN [ ] SU [ ]

UFS [ ] NMU [ ] WSU [ ] UMP [ ] SPU [ ] UNIVEN [ ] SMU [ ]

UFH [ ] UNIZULU [ ] CUT [ ] UL [ ] RU [ ]

Role: [ ] Executive [ ] Senior management [X]

[ ] Other (option).....

Number of years you have worked in institution.

[ ] Less than a year [ ] 1-3 years [ ] 4 -6 years [X] 7-10 years [ ] above 10 years

SECTION C: BACKGROUND INFORMATION

1. How many qualified employees does your library have? -
2. In the next five (5) to ten (10) years, how do you see personnel complements changing?
3. What are the most significant obstacles (IT function) you and your professional personnel face when serving your clients?
4. Does your department have sufficient staff to execute the IT function library mandate?

SECTION D: TECHNOLOGICAL IMPACT OF THE NEXT GENERATION ILS IN LIBRARIES

What is the nature and extent to the adoption and maintenance of the next generation library ILS in academic libraries in South Africa?

1. Which next-generation Integrated Library System(s) (ILS's) are you currently using in your Library?
2. Which system(s) (traditional ILS) were in place prior to the current system(s)?
3. Which factors were considered by your library before adopting the next generation ILS in your library?
4. What user training qualities were considered when considering user-training as factor for the adoption of next generation ILS?

5. Purchasing a new software system is a great step in the right direction for your library business requirements. What critical steps does your library need to take for an implementation of a newly purchased software or system?

6.. Have you ever noticed a significant problems/challenges in the adoption of next-generation ILS in your library?

7. How can we reduce failures in the implementation of next-generation ILS in your library?

8. What advice do you have for someone who needs to make the shift from traditional library integrated system (ILS) to a next generation integrated (ILS) library system to meet Library 4.0 goals in service delivery?

9. How may your institution, from an executive management standpoint, assist your library in successfully providing Library 4.0 services

SECTION E: LIBRARY PROFFESSIONAL ADOPTION IN THE NEXT GENERATION ILS

a) Which of the following skills and knowledge training are required for library staff to manage the adoption and maintenance of next generation ILS effectively and efficiently in academic libraries? Required = R, Not Required NR

S/N	Generic Skills	R	NR
1	Communication skill	X	
2	Adaptability	X	
3	Assertiveness	X	
4	Innovation	X	
5	Creativity	X	
6	Analytical skills	X	
7	Problem solving	X	
8	Presentation skills	X	
9	Time management	X	
10	Decision making	X	
11	Customer relationship	X	
12	Flexibility	X	
13	Assertiveness	X	
14	Stress management	X	

15	Interpersonal skills	X	

Other (Specify) ____increasing efficiency_____

S/N	Managerial Skills	R	NR
1	Planning and organizational skills	X	
2	Finance management skills	X	
3	Local and global thinking	X	
4	Managing change	X	
5	Team building	X	
6	Leadership	X	
7	Project management	X	
8	Consumer management skills (User need analysis, Information seeking, behaviour analysis)	X	
9	Resources management	X	
10	Negotiation skills	X	

Other (Specify) _____

S/N	Professionals Skills	R	NR
1	**Information Technology Skills**		
1.1	Hardware/ software and networking Skills	X	
1.2	Library automation	X	
1.3	Internet e.g., E- Mail management, Intricacies of internet search tools	X	
1.4	Intranet skill	X	
1.5	Networking skills (content development, digitization, web-based services, on-line database searching etc.)	X	
1.6	MS-suite	X	
1.7	Presentation software e.g., PowerPoint	X	

Other (Specify) _____

15	Interpersonal skills	X	

Other (Specify) ____increasing efficiency_____

S/N	Managerial Skills	R	NR
1	Planning and organizational skills	X	
2	Finance management skills	X	
3	Local and global thinking	X	
4	Managing change	X	
5	Team building	X	
6	Leadership	X	
7	Project management	X	
8	Consumer management skills (User need analysis, Information seeking, behaviour analysis)	X	
9	Resources management	X	
10	Negotiation skills	X	

Other (Specify) _____

S/N	Professional Skills	R	NR
1	**Information Technology Skills**		
1.1	Hardware/ software and networking Skills	X	
1.2	Library automation	X	
1.3	Internet e.g., E- Mail management, Intricacies of internet search tools	X	
1.4	Intranet skill	X	
1.5	Networking skills (content development, digitization, web-based services, on-line database searching etc.)	X	
1.6	MS-suite	X	
1.7	Presentation software e.g., PowerPoint	X	

Other (Specify) _____

S/N	Technical Skills	R	NR
1	Information resource management	X	
2	E- serial management	X	
3	Metadata1 standards e.g. Dublin core, MARC, TEI2 , XML3 etc.	X	
4	Standards e.g., Z39.50	X	
5	System development	X	

S/N	4th Industrial Revolution/Library 4.0 Skills	R	NR
1	Information curation	X	
2	digital scanning, preservation;	X	
3	Cloud data expansion;	X	
4	in-depth research skills	X	
6	technology design and programming;	X	
7	critical thinking and analysis	X	
8	emotional intelligence;	X	

Other (Specify) ____Artificial Intelligent_____

SECTION F: RESOURCE SHARING AND ROLE OF LIBRARY CONSORTIA IN SOUTH AFRICA

1. Which consortiums does your library belong to?

2. Are the consortia efforts delivering value to you?

3. How does the support or information you receive from your consortia enhance your library automation status?

SECTION G: DATA PRIVACY AND SECURITY

How is privacy and security maintained in the adoption of the next ILS in academic libraries?

General Data Protection Regulations (GDPR) adopted by European union in May 2018 became a business requirement and as a collaborative partnership to ensure that adequate measures are in place to protect the management and transfer of personal information in organizations. This supported by the Protection of Personal Information Act (POPIA) that finally came into force in South Africa on 1 July 2020. For accessibility, having a centralised site for data storage management is essential. Structured processes and systems that enable version control and solid security protocols are required for managing, auditing, and protecting data, allowing businesses to gather and manage access to many records and documents. Library privacy practice in response to the challenges of network environment is one of the key roles of ICT and library IT department. This questionnaire is intended to research how organisations such as yours are overcoming the challenge of ongoing data protection compliance.

1. In your organization, who oversees data protection?

☐ Data Protection Officer ☐ Compliance and Risk Officer

☐ IT Manager ☐ CTS (Computer and Telecommunication Service Director)

☐ Other (Please specify) ____Data governance committee (Institutional)_____

2. Who does the person responsible for data protection report to in your organization? Executive Chief operation Officer

3. What do you think your organization's general level of data protection awareness is?

4. Which systems/steps to Data and Network Security do you employ to assist you in maintaining data security compliance? ICTS fishing attempts

5. How does privacy and security affect LIS professionals and executive management roles in the adoption and maintenance of the next generation ILS in academic libraries

6. Do you have any questions that you need to ask or any input that you need to add in this interview

ANNEXURE C: PRE-TEST OF INSTRUMENTS AND PILOT STUDY

DUT
DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

The report represents the results 10 respondents for pre-testing the online survey questionnaire for the research study including 3 respondents for the online interview questionnaires.

1. **Online Survey Questionnaires**

On 20th October 2021, the researcher emailed 10 academic librarians from Cape Peninsula University of Technology requesting them to participate in the pre-test of the online survey questionnaires. The academics agreed to participate in the pre-test of the online survey questionnaire. A web-based software QuestionPro was used to design and distribute questionnaires. In this study, the respondents were asked to:

- Make comments, suggestion, and recommendations for the feasibility of the study.
- Pinpoint questions and instructions that needs more clarity.
- Pinpoint questions and instructions that needs more clarity.
- Record the time spent in completing the questionnaire.
- Identify unsettling or offensive questions.
- Detect ambiguous questions.
- Review language and grammar used.

Table 1 below reflects the distribution and response rate for the pilot study of web questionnaire

Desktop/Mobile/Laptop Device				
Respondent	Number of questionnaires distributed	Number of questionnaires returned	Time taken to complete questionnaire's	Date Completed
Participant 1	1	1	42 Minutes	25/10/2021
Participant 2	1	1	43 Minutes	25/10/2021
Participant 3	1	1	22 Minutes	26/10/2021
Participant 4	1	1	9 minutes	2/11/2021
Participant 5	1	1	44 minutes	3/11/2021
Participant 6	1	1	12 minutes	8/11/2021

Table1: The distribution and response rate for pre-testing the web survey questionnaire.

Respondents agreed the questions, instructions of the web questionnaires were valid, reliable clear and unambiguous. Respondents also felt that there were no omissions to questions. They also mentioned that the questions were not offensive, confusing, or sensitive. There were also no issues reported on language and grammar.

However, there were several minor changes identified by respondents on the web questionnaires. These changes included Question 12 (Q12) the change to acronym next-generation ILMS (Integrated Library Management Systems) to the preferred next- generation ILS (Integrated Library System) to be consistent in the study. The other change was on Question 23 (Q23) the new name changes of the library consortia CALICO (Cape Library Co-operative) to CHELin (Cape Higher Education Library

Network). CHELiN is a project of the Cape Higher Education Consortium (CHEC) and consists of the four higher education libraries in the Western Cape.

Participants were given two weeks to complete the survey to ensure that their normal library operation is not impacted. The allocated time for the survey was 45 minutes, the highest time completed on the online survey was 44 minutes, there was no need to change the time allocated to respondents to answer the online survey questionnaires. All the questions were completed on different dates and returned.

All participants answered using a desktop/laptop/mobile device for the web survey. To make the survey easier a link survey was created using QR code to allow the user to have direct link to the survey via their mobile devices to allow easy access during the country's Lockdown Level 2 and to observe and adhere to Covid-19 restrictions and protocols.

2. **Online Interview Questionnaires**

On 27th October 2022, the researcher emailed three (3) Library Directors selected from 26 Public Universities in South Africa to request to request the pre-test on the online interviews. The academic libraries selected were: Central University of Technology (CUT), University of Witwatersrand (WITS) and University of Venda (UNIVEN). The Directors agreed on the online interviews and Microsoft Teams was used to distribute the interview questionnaires attached to the invitation. The respondents agreed for the interview to be recorded on MS Teams, in addition AI Otter, a software that uses artificial intelligence was used transcription.

In this study, the respondents were asked to:

- Make comments, suggestion, and recommendations for the feasibility of the study.
- Pinpoint questions and instructions that needs more clarity.
- Pinpoint questions and instructions that needs more clarity.
- Record the time spent in completing the questionnaire.
- Identify unsettling or offensive questions.
- Detect ambiguous questions.
- Review language and grammar used.

Table 2 below reflects the distribution and response rate for the pilot study of interview questionnaire's:

Desktop/Mobile/Laptop Device				
Respondent	**Number of questionnaires distributed**	**Number of questionnaires returned**	**Time taken to complete questionnaire's**	**Date of Interview**
Participant 1	1	1	39 Minutes	18/11/2021
Participant 2	1	1	40 Minutes	25/11/2021
Participant 3	1	1	22 Minutes	2/12/2021

Table 2: distribution and response rate for the pilot study of interview questionnaire's

Respondents agreed the questions, instructions of the interview guideline sent prior to their interviews were reliable, clear, and unambiguous. Respondents also felt that there were no omissions to questions. They also mentioned that the questions were not offensive, confusing, or sensitive. There were also no issues reported on language and grammar. There were no changes identified by respondents on the online interview questionnaires.

Participants were given one week to prepare for the interviews and were given option to select their own dates and times for interviews to accommodate their busy schedule as executive management. The allocated time for the survey was 45 minutes, the highest time completed on the online interviews was 40 minutes, there was no need to change the time allocated to respondents to answer the online survey questionnaires. All the questions were completed on different dates and returned.

All participants answered using a laptop on online MS Teams. Interview were conducted online on the country's Lockdown Level 2 and to observe and adhere to Covid-19 restrictions and protocols.

STUDENT NAME...Regina Balengane Sikhosana.....

SIGNATURE--- ----------DATE----21 November 2021-----

SUPERVISOR NAME-Dr M Rajkoomar

SIGNATURE---------- DATE---21 November 2021----

CO-SUPERVISOR NAME—Dr N Naicker

SIGNATURE---------- DATE-----21 November 2021----------

ANNEXURE D: INFORMATION LETTER TO THE PARTICIPANTS

LETTER OF INFORMATION

Principal Investigator/s/researcher:

Name: Regina Balengane Sikhosana

Qualifications: Hochschule Wismar University, Germany: Master Business Systems (MBS), Cape Peninsula University of Technology, Cape Town: Master Business Information Systems (MBIS)

Co-Investigator/s/supervisor/s:

Supervisor: Dr Mogiveny Rajkomaar

Qualifications: PhD (Library and Information Science)

Dear Prospective Participant

My name is **Ms Regina Balengane Sikhosana**, a PhD Library and Information Science student at the Durban University of Technology. I am conducting research with Dr M Rajkoomar, a Senior lecturer in the Department of Library and Information Science, DUT, and Dr R Sentoo, a Senior Lecturer in the Department of Information Technology, DUT. We are inviting you to participate in a study entitled

"The development of a model for decision-making for adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa".

1. **Brief Introduction and Purpose of the Study:**

The next generation ILS has been introduced for more than a decade ago and is still in the process of being adopted by academic libraries in South Africa. Currently, there is no model to guide LIS professionals in terms of standarzation and best practices to assist ILS professionals in decision making for selecting a suitable system for their libraries for managing library information resources. In this research, it is acknowledged that the next generation ILS is still in its infancy and has not been adopted by most academic libraries especially in South Africa. There is limited literature of empirical research to investigate the intention for the adoption and maintenance of the next generation ILS in libraries. The model designed from this study may assist LIS professionals about best practices and standards in selecting suitable next generation ILS to meet their business requirements as well as impact on their occupational performance.

2. **Research aim:**

   The aim of this research is to explore the development of a model on decision-making for the adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa.

3. **Research objectives**

The objectives of this study are as follows:

- To determine the nature and extent of adoption and maintenance of the next generation library ILS in academic libraries in South Africa?
- To identify the requirement of competencies amongst LIS professionals for their involvement in the adoption and maintenance of the next generation ILS in academic libraries in South Africa.
- To determine how privacy and security is maintained in the adoption of the next ILS in academic libraries in South Africa.
- To develop a model for the adoption and maintenance of the next generation library ILS in libraries at tertiary academic libraries in South Africa.

3.3 Role of participants in the study

The participants identification and recruitment process adhere to Protection of Personal Information Act 4 of 2013 (POPI Act) It is the responsibility for me as a Doctoral Student, in conjunction with the supervisor and the University, to ensure that all research activities carried out in outside my institution comply with the laws and regulations of South Africa and/or the foreign country in which the research activities are conducted. These include all human and animal subjects, copyright and intellectual property protection, and other regulations or laws, as appropriate. A research ethics committee must review and approve the ethical and academic rigour of all research prior to the commencement of the research and acceptance of granting me permission to conduct research in their institution/organisation

The target population is 550 LIS professionals meet this criterion. To the quantitative phase which encompasses six categories of LIS professional as identified in the academic institution's library webpages according to their roles in managing and working with ILS. LIS professionals consist of 1) IT Managers (n=26) 2) Technical Services Managers (n=26), Systems Librarians (n=26), Electronic Resources Librarians (n=26), Faculty/Subject Librarians (n=218), and branch librarians (n=228). 550 participants will participate on the online survey questionnaires. In the survey consent form the participant's individual's decision to complete the survey will be taken as their formal consent to participate in the survey. Semi-structures interviews to interview executive management staff in academic libraries, LIS executive management were selected because of their responsibility for providing the overall strategic leadership regarding all academic content information for the institution and provides strategic management of all library delivery of its vision and mission. The purposive sample consists of 26 Library Directors from 26 academic libraries in South Africa

The role of the participants is to respond to questions contained within a questionnaire or an interview schedule. The link to the online survey (a self-administered questionnaire) will be sent via email to LIS professionals selected to participate in the survey. Library Directors/University Librarians will be invited to participate in an online semi structured interview. The interviews will be recorded and will be transcribed after the interviews. The expected duration of participation in the questionnaires is approximately 45 minutes and the interviews will also be approximately 45 minutes per session. All questions asked will be directly related to academic libraries and adoption of the next generation ILS on the following aspects:

- level of adoption of the next generation ILS in academic libraries in South Africa
- it will provide us with enough information about staff training and skills development programmes that can be compared to other academic libraries in your field in different public universities
- current professional status in the LIS industry and lastly
- the role that the consortia play in your organization in library automation
- privacy and security maintained in the adoption of the next ILS in academic libraries?

ANNEXURE E: ETHICS CLEARANCE LETTER

DUT
DURBAN UNIVERSITY OF TECHNOLOGY
IYUNIVESITHI YASETHEKWINI YEZOBUCHWEPHESHE

FACULTY OF ACCOUNTING & INFORMATICS

Faculty Research Office
Durban University of Technology
07 September 2021

Student: Regina Sikhosana
Student Number: 22175407
Degree: Doctor of Philosophy in Library and Information Science
Email: 22175407@dut4life.ac.za
Supervisor: Dr Rajkoomar
Supervisor email: mogier@dut.ac.za

Dear Ms Sikhosana

ETHICAL APPROVAL: LEVEL 2

The development of a model for decision-making for adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa' has been received.

The Faculty Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool. Kindly ensure that participants used for the pilot study are not part of the main study. In addition, the FREC acknowledges receipt of your gatekeeper permission letter.

Please note that **FULL APPROVAL** is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the FREC according to the FREC SOP's. Please note that any deviations from the approved proposal require the approval of the FREC as outlined in the FREC SOP's

Yours sincerely

Dr Trisha Ramsuraj

FREC Deputy Chair
Faculty of Accounting and Informatics
Durban University of Technology
Ritson Campus

ANNEXURE F: ETHICAL CONSENT LETTER

CONSENT

Full Title of the Study: The development of a model for decision-making for adoption and maintenance of the next generation integrated library systems (ILS) in academic libraries in South Africa.

Names of Researcher/s: Rezina Balenzane Sikhosana

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher about the nature, conduct, benefits, and risks of this study
- I have also received, read, and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during this research which may relate to my participation will be made available to me.

Full Name of Participant	Date	Time	Signature / Right Thumbprint

I
(name of researcher) herewith confirm that the above participant has been fully

informed about the nature, conduct and risks of the above study.

Full Name of Researcher	Date	Signature

ANNEXURE G: EDITOR'S CERTIFICATE

DR PATRICIA HARPUR

B.Sc Information Systems Software Engineering, B.Sc Information Systems (Hons)
M.Sc Information Systems, D.Technology Information Technology

Editing Certificate

19 Keerweder Street
Vredelust
Bellville
7945

083 730 8540
doc@getthatresearchdone.com

To Whom It May Concern

This document certifies I have copy-edited the following thesis by Regina Baleng-Ane Sikhosana Student Number 22175407:

THE DEVELOPMENT OF A MODEL FOR DECISION-MAKING FOR THE ADOPTION AND MAINTENANCE OF THE NEXT GENERATION INTEGRATED LIBRARY SYSTEMS (ILS) IN ACADEMIC LIBRARIES IN SOUTH AFRICA

Please note this does not cover any content, conceptual organisation, or textual changes made after the editing process.

Best regards

Dr Patricia Harpur

20 October 2023